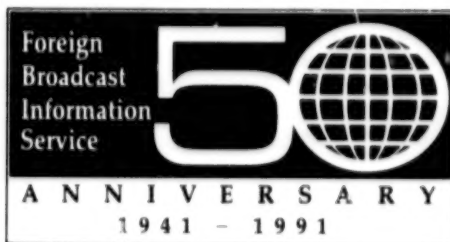


JPRS-TND-91-005  
28 MARCH 1991



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## ***JPRS Report***

# **Nuclear Developments**

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# NUCLEAR DEVELOPMENTS

JPRS-TND-91-005

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### **Indonesia Says PRC Agrees to Satellite Launch**

*OW1203130191 Tokyo KYODO in English 1242 GMT  
12 Mar 91*

[Text] Jakarta, March 12 KYODO—Indonesian Minister of Posts and Telecommunications Soesilo Soedarman disclosed Tuesday that China has agreed to the contract terms proposed by Indonesia to cover the launching of an Indonesian-owned satellite aboard a Chinese rocket, the national news agency ANTARA reported.

"The contract procedures we required included a cash payment of 25 percent, an export license from the United States, and an agreement by the Chinese Government not to resell Indonesian commodities they acquire as counter-trade payment for the launching," Soedarman said.

Soedarman also said China expects the Indonesian Government, through the state-owned telecommunication company Perumtel, to negotiate with the U.S. Government to obtain the export license for the American-made satellite.

The satellite to be launched, the Palapa B-4, valued at 53 million dollars, was made by Hughes Aircraft Co.

According to U.S. law, all satellites made in the U.S. must be launched by U.S. firms or agencies unless special permission is obtained. The law is designed to protect technological secrets.

The Palapa B-4 was originally scheduled to go into orbit in 1994, but the date was moved up due to growing demand in the country for satellite services.

"Indonesia expects Palapa can be launched at least by 1992," Soedarman told ANTARA.

Soedarman said the party to launch the satellite will depend on the U.S. decision. Currently there are three companies proposing to launch the satellite, Arianespace of France, Delta of the U.S., and Great Wall Corp. of China with its Long March rocket.

"The three companies have the same chances but the Indonesian Government will choose the one regarded most capable and beneficial," ANTARA quoted Soedarman as saying.

The Indonesian and Chinese officials held talks in January to hammer out conditions for the launch.

The Beijing Government asked for 17 million dollars to handle the launch during President Suharto's visit to China on November 15, according to Economic, Financial, and Industrial Affairs Minister Radius Prawiro.

### **Dayawan Nuclear Power Station Enters Installation Phase**

*OW2003045391 Beijing XINHUA Domestic Service  
in Chinese 2105 GMT 19 Mar 91*

[By reporter Qi Xiu (2058 0128)]

[Text] Shenzhen, 20 Mar (XINHUA)—Since the beginning of the Year of the Goat, the construction project of the Dayawan Nuclear Power Station in Guangdong has begun to enter the important phase of equipment installation.

During a recent visit to the construction site of the power station, this reporter could only see the first and second generating units on Hedao and Changguidao, which were like armored giants standing on the seaside. All main equipment has been properly positioned, and over half of the auxiliary equipment has been installed. The foreman at the construction site told the reporter that the various quality indicators for the entire project must meet international safety standards for nuclear power stations. Installation at the power station was jointly undertaken by France's (Famat/Spi) Company and the No. 23 company and Shandong and Dongbei Nuclear Power Company of China Nuclear Industry Corporation. Assuming the attitude of hard work, plain living, and conscientiousness of China's working class, Chinese installation workers are undergoing rigorous tests during the great project of Dayawan, which is carried out in strict accordance with international standards. The foreman told the reporter: Quality requirements for "Hedao" are particularly stringent. Purity for the project's materials has been set at 0.99999, which is purer than gold ornaments. Laser devices are used to measure positioning errors in the installation of equipment, and positioning errors smaller than the thickness of hair can be detected. The welded joints on all large and small pipes must be inspected by X-rays and embossed with a steel stamp indicating the welder's name and the date of operations. X-ray plates must be kept for reference.

### **Song Jian Discusses Nuclear Energy Development**

*HK1503093891 Beijing RENMIN RIBAO in Chinese  
12 Mar 91 p 4*

[Report by Jiang Hanzhen (5592 3211 4631): "Song Jian Attends a Meeting on the Strategic Target for the Development of Energy Resources"]

[Text] Beijing, 11 Mar (RENMIN RIBAO)—A meeting to listen to a report on the 863 plan concerning the strategic target for energy resources, a plan of far-reaching significance to energy development in the 21st century, ended today. The State Council's technology and planning coordination group examined the strategic target for energy development after soliciting opinions from the relevant ministry, commission, and experts on the development target in China's energy field.

In his speech, Song Jian, chairman of the State Science and Technology Commission, fully confirmed the efforts made by the Energy Experts' Commission during the Seventh Five-Year Plan.

This reporter learned that the 863 plan concerning energy resources comprises two main aspects. The first involves fuel coal for magneto-fluid electricity generation, in which thermal energy is directly turned into electric energy. This electricity generation is highly efficient and can help save fuel and water. In addition, generation can proceed on high-sulphur coal, which basically does not produce pollution and suits the construction and transformation requirements for large power stations.

The second main aspect involves advanced nuclear reactor technology. The use rate of uranium resources is low in the compressed-water reactor nuclear power stations now being built in China. Therefore, there is a need to conduct research into advanced, safe, and economical nuclear reactor technology for which China's nuclear fuel can be fully utilized to lay a foundation for China's nuclear energy development in the next century.

#### Report on Missile Production, Development

HK2003071991 Beijing ZHONGGUO XINWEN SHE  
in Chinese 1151 GMT 19 Mar 91

[Report by Zhu Daqiang (2614 1129 1730): "China Has Formed an Independent and Complete Missile Industrial System"—ZHONGGUO XINWEN SHE headline]

[Text] Beijing, 19 Mar (ZHONGGUO XINWEN SHE)—Through 30 years of developing the missile industry, which plays an important role in China's national defense, China has formed a comparatively complete, independent, and coordinative tactical missile research and production system, thus acquiring the ability to manufacture new-type missiles.

A person from the Ministry of Aeronautics and Astronautics Industry revealed that China had developed many models of air-to-air missiles and sea defense missiles. Ten of these models have been put into production and used to equip the Chinese Air Force and Navy.

China started its missile research in the mid-1950's and set up a special institute engaged in missile research in October 1956.

According to an agreement on new technology between the Chinese and Soviet governments, during the initial stage of its missile research, China should follow Soviet patterns in manufacturing missiles. It succeeded in manufacturing P-2 surface-to-surface missiles, "Red Flag" No. 1 surface-to-air missiles, "Thunderbolt" No. 1 and "Thunderbolt" No. 2 air-to-air missiles, and "Upstream" No. 1 ship-to-ship missiles. With the production of these missiles, China laid the foundation for its tactical missile industry.

In November 1964, the Chinese Government formed a special organization to take charge of research into strategic and large missiles as well as the development of carrier rockets and the spaceflight industry. In the early 1980's, China successfully launched an intercontinental missile over the Pacific Ocean.

Over the last few years China has concentrated on the research and manufacture of air-to-air missiles and sea defense missiles, and formed a research and development center for air-to-air missiles. In the field of sea defense missiles, over 40 factories have been built across the country to coordinate the research and manufacture of these missiles. A development impetus remains in China's tactical missile research and some models have reached advanced international standards.

#### Second Nuclear Plant Planned for Guangdong

HK0803013991 Hong Kong SOUTH CHINA  
MORNING POST in English 8 Mar 91 p 1

[By Daniel Kwan in Guangzhou, Chris Yeung, and Geoff Crothall]

[Text] China has decided to build a second nuclear power plant in Guangdong, with Daya Bay the most probable site.

According to sources it has already been chosen but is not being publicised "to avoid arousing unnecessary attention."

The news comes three months after the general manager of Electricite de France (EdF), the major foreign contractor on the nuclear power plant being built at Daya Bay at present, caused a public outcry when he announced that the same region had been chosen for a second facility.

He later issued a statement saying the site had yet to be determined.

Confirmation that a second plant would be built was revealed officially for the first time in the Provincial Eighth Five-Year Plan (1991-95) tabled at the opening of the Guangdong People's Congress yesterday which said "preparatory work" for the plant should be completed before 1995, with construction starting during the Ninth Five-Year Plan period.

While delivering his government work report yesterday, Guangdong Governor Me Ye Xuanping focused on the need to tap nuclear power resources to solve the severe electricity shortage in the booming province.

"In the coming 10 years, Guangdong will steadfastly implement the decision, so that while we are investing in the development of thermal and hydropower, we will actively develop nuclear power," he said.

"We will concentrate our resources on building a large number of coal-fired power plants along our coastline and building our second nuclear plant."

Mr Ye did not indicate where the second plant would be built, but experts have identified three sites—Daya Bay, Yangjiang and Taishan.

And sources say Daya Bay, 30 kilometres over the border, where the province's first \$28.6 billion Sino-Hong Kong joint-venture nuclear plant is being built, has been chosen for economic reasons.

EdF is likely to have a major role in building the second plant.

Guangdong's vice-governor, Mr Kuang Ji, who is responsible for energy development, was in Paris last month for talks with EdF executives on future areas of Sino-French co-operation.

In January, the company had presented a "full and comprehensive" tender for a second twin pressurised water reactor nuclear power plant to Mr Kuang's office.

Although he gave no specific response to EdF's proposal, Mr Kuang was said to be "very optimistic" about the development of nuclear energy in Guangdong.

"Mr Kuang basically said the same thing as Governor Ye Xuanping in his work report," said director of EdF's Far East Operation, Mr Vincent de Revas, last night.

Speaking from Paris, Mr de Revas said EdF was keen to go ahead with any new nuclear power station projects in China, particularly in Guangdong, and expressed confidence his company would eventually win the contract for the second Guangdong plant.

A senior Guangdong official said it was China's policy to develop nuclear power to meet the increasing demand for electricity.

Although the problem had been eased in the past year because of declining industrial growth, he said the province still faced a 20 per cent shortage of electricity in the years ahead.

But he added that the final decision on the second plant would have to be taken by Beijing.

Analysts say the Daya Bay region and adjacent Huizhou have emerged as the most significant economic regions in Guangdong because of the strong backing from Mr Ye, the party and military leaders.

China's President Mr Yang Shangkun and Vice-President, Mr Wang Zhen, both of whom have strong military ties, have made separate inspection tours of Huizhou in the past few months and indicated their personal backing.

Experts in Guangdong have also proposed the setting up of a special economic zone at Daya Bay to form a major powerhouse for the province's economic development.

The idea was raised at a meeting of the Guangdong People's Political Consultative Conference yesterday.

The power plant aside, the area is adjacent to Nanhai, which is a favourable site for a deep water harbour.

Huizhou is also home to China's largest vehicle joint venture, the Panda Plant, and a U.S.\$2.4 billion (HK\$18.72 billion) joint-venture petrochemical firm.

Some delegates suggested the region should concentrate on large-scale, high-technology projects, which would also spell benefits for neighbouring districts and counties.

### **Bank of China Grants Loan To Guangdong Nuclear Plant**

*HK2003022091 Beijing CHINA DAILY in English  
20 Mar 91 p 2*

[By staff reporter Xu Yuanchao]

[Text] The Bank of China yesterday signed an agreement with the Guangdong Nuclear Power Joint Venture Co Ltd (GNPJVC) to provide \$400 million in commercial loans to the Daya Bay Nuclear Power Station.

An official from the bank said the money raised from international financial markets was "the largest sum" in commercial loans provided to the nuclear plant, and would be used to finance construction in the second half of this year and the next two years.

Zan Yunlong, GNPJVC general manager, told CHINA DAILY in an interview that the Daya Bay station, China's largest joint venture to date, had now entered the crucial stage of installation of equipment.

The station, located in South China's Guangdong Province and about 50 kilometres from Hong Kong, will have two 900-megawatt pressurized water reactors.

The first reactor is scheduled to be commissioned in October next year, with the second due to come on-line in July, 1993.

Zan said equipment installation at the plant was proceeding on schedule. This year would be vital for the power station with installation, equipment testing and preparations for trial operation, he added.

"We will continue to pay close attention to safety and quality as the plant is nearing completion," he said.

The general manager said all main equipment for the nuclear reactor for the No. 2 generating unit had been installed.

Other key equipment for the unit was scheduled to be delivered to the construction site in the first half of this year, he said, adding that installation was expected to be completed in the third quarter.

Installation of the main equipment for the No. 1 generating unit had been completed at the plant and was now undergoing testing, he said.

Zan said construction of the plant could proceed as scheduled thanks to the State Council and other departments which he said had spared no efforts to support the project.

The power plant, he said, would not only ease Guangdong's power shortage but also benefit its export-oriented economy.

The plant, construction of which began in October 1986, will be capable of generating 10 billion kilowatt-hours of electricity a year on completion.

#### **Nuclear Power Workers Complete Training Abroad**

*HK1203111591 Hong Kong ZHONGGUO TONGXUN SHE in Chinese 0911 GMT 9 Mar 91*

["Dispatch" by reporter Yi Li (0122 0448): "Huang Pao-hsin Discloses That Some 100 Workers From Daya Bay Nuclear Power Station Have Completed Their Training Courses Abroad"—ZHONGGUO TONGXUN SHE headline]

[Text] Hong Kong, 9 Mar (ZHONGGUO TONGXUN SHE)—Huang Pao-hsin, chairman of the Daya Bay Nuclear Power Safety Consultative Committee, disclosed that the majority of Guangdong Daya Bay Nuclear Power Station workers who had gone abroad for training had completed their training courses and returned home. A few days ago, on behalf of the French

Electric Power Company, Kalai [0595 6849 1002], vice president of the French Electric Power Company, awarded certificates to workers who had successfully completed training courses abroad.

Huang Pao-hsin told this reporter that from 1987 to March 1991, five groups of some 140 workers from Daya Bay Nuclear Power Station in the specific fields of production, management, operations, and maintenance went to France and Britain for training for one year or so. At present, except for a small number of workers still continuing with their study in foreign countries, the majority of workers have completed their training courses and returned to Guangdong Daya Bay Nuclear Power Station to participate in the work of installation, checking and accepting completed projects, debugging, and preparations for production.

Huang Pao-hsin stated that the Guangdong Daya Bay Nuclear Power Station workers to go abroad for training were selected from engineers, technicians, and graduates of universities and colleges with experience in reactor or power plant operations and were sent abroad for training after passing foreign language and professional examinations. After obtaining certificates of training in France, they must still pass the examinations conducted by China's departments in charge—China National Nuclear Industry Corporation and Nuclear Safety Administration—and an examination of qualifications and obtain operation certificates before they could formally take up their posts and start to operate Guangdong Daya Bay Nuclear Power Station.



## JAPAN

### Nuclear Materials Not Part of USSR Agreement

OW2203113191 Tokyo KYODO in English 1103 GMT  
22 Mar 91

[Text] Tokyo, March 22 KYODO—Exports and imports of nuclear-related materials will not be included in a Japan-Soviet atomic energy cooperation agreement, due to be signed during Soviet President Mikhail Gorbachev's April 16-19 visit to Japan, government sources said Friday.

The agreement will not cover those items because Japan considers it too early for a full-scale treaty involving them to be signed and because the domestic electric power industry is not enthusiastic about importing Soviet-made enriched uranium, the sources said.

In working level talks, the Soviet Union has insisted on a full-scale treaty which will lead to the exportation of materials such as enriched uranium.

The agreed contents of the agreement only cover ensuring security of nuclear facilities, protection from and observation of radiation, studies on the peaceful use of atomic energy, and the treatment of radioactive wastes, the sources said.

The government will approve the contents of the accord at a cabinet meeting in early April, the sources added.

### Metal Fatigue Linked to Nuclear Plant Accident

OW1103174091 Tokyo KYODO in English 1515 GMT  
11 Mar 91

[Text] Tokyo, March 11 KYODO—A metal part not installed according to specifications may have been the direct cause of last month's accident at a nuclear power plant in Fukui Prefecture, the government said Monday.

In the February 9 accident, the reactor's emergency core cooling system was activated to avert a possible meltdown after 55 tons of radioactive water leaked from the main cooling system into the secondary system that powers the plant's turbine.

The leak, at Kansai Electric Power Co.'s Mihama Nuclear Power Plant, occurred because of breakage in one of the tiny pipes that transfer heat between the two systems.

The pipes, which run in a series of loops, are supposed to be held together by a so-called antivibration metal fitting (AVB), fixing the pipes to reduce the high-frequency vibrations that can cause metal fatigue.

In this case, however, the AVB was not installed around as many pipes as the reactor's blueprints called for, officials said, leading to the metal fatigue that caused the pipe to break, allowing water to flow out of the reactor core into the secondary system.

Mitsubishi Heavy Industries admitted responsibility the same day for not having installed the AVB according to specifications, adding that there was no system in place to check on the installation.

Human error involving a high-pressure escape valve in the primary cooling water system at the complex also contributed to the accident, the International Trade and Industry, and the Resources and Energy Agency said.

A plant worker mistakenly closed the valve, designed to release excessive pressure in the primary cooling system, during regular checkups in April through July last year, officials said.

The valve did not work when plant workers tried to activate it during the accident, Japan's worst to date.

Government officials said they have instructed five power firms which operate 16 pressurized water reactors of the same type as the one at Mihama to determine whether their AVBs are properly fitted.

### Defective Part Linked to Nuclear Plant Accident

OW1803134091 Tokyo KYODO in English 1325 GMT  
18 Mar 91

[Text] Tokyo, March 18 KYODO—A part whose incorrect installation has already been linked to an accident last month at a Fukui Prefecture nuclear power plant was also deformed, sources at the Natural Resources and Energy Agency and Kansai Electric Power Co. said Monday.

The so-called antivibration bar (AVB) is supposed to hold together the tiny pipes that carry high-pressure boiling water in a series of loops in a nuclear reactor's steam generator. The device is designed to reduce the vibrations that can cause metal fatigue.

But in the case of Mihama Nuclear plant's No. 2 reactor, the normally V-shaped AVB had an extra bend in the middle, the sources said.

The agency said last week that the AVB was not installed around as many pipes as called for in the reactor's blueprints.

On February 9, one of the pipes that should have been held in place by the AVB broke, allowing 55 tons of radioactive water to leak from the primary cooling system to the secondary system that powers the plant's turbine.

This led to activation of the reactor's emergency core cooling system, averting a possible meltdown, in the first incident of its kind in Japan.

Last week, the agency announced the misplacement of the AVB may have been the direct cause of the accident and Mitsubishi Heavy Industries, the reactor's manufacturer, admitted responsibility for not having installed the AVB according to specifications.

**Cause of Mihama Nuclear Plant Accident Not Known***OW1303192091 Tokyo NHK General Television Network in Japanese 1000 GMT 12 Mar 91*

[Text] Regarding the accident of the No. 2 reactor at Kansai Power Company's Mihama Nuclear Power Generating Station in Fukui Prefecture, the Ministry of International Trade and Industry's special investigation committee, composed of a group of specialists, including scholars, made an on-site investigation today. In a news conference following the investigation, Kunihiro Iida, chief of the committee, said. We do not know why only one of the eight small pipes, for which metal fittings were not installed as designed, was damaged. The metal fittings are designed to prevent vibration of the small pipes. The accident may be attributed to something other than the vibration preventing metal fittings so we would like to carry out further, detailed investigations.

**Shutdown Ordered for Reactor at Takahama Plant***OW2003144791 Tokyo KYODO in English 1222 GMT 20 Mar 91*

[Text] Tokyo, March 20 KYODO—The government ordered Kansai Electric Power Co. Wednesday to shut down No. 2 Reactor at its Takahama plant pending inspection of faulty installation of a device linked to an accident at another facility operated by the company, officials said.

The officials said the order was issued by the Ministry of International Trade and Industry [MITI] to check a slender antivibration bar (AVB) designed to reduce vibrations in tiny pipes attached to the steam generator (SG) of the 826,000 kilowatt boiling water-type reactor.

The officials said tests by an electric inspection device confirmed the antivibration bar was not installed correctly.

Kansai Electric Power Co. said the reactor in Takahama town, Fukui Prefecture, will be shut down by midnight Wednesday to correct the faulty installation.

Mitsubishi Heavy Industries Ltd., main contractor of the reactor, said it also will take measures, if necessary, to correct the installation in accordance with the design.

The company said it is reexamining data on nine other reactors of similar type currently in operation in order to confirm the location of the antivibration bar in the steam generator pipes.

The reactor is the second facility operated by Kansai Electric Power Co. to be shut down for a similar reason.

On February 9, a reactor at the company's Mihama plant also in Fukui Prefecture, one of pipes that should have been held in place by the bar broke, allowing 55 tons of radioactive water to leak from the primary cooling system that powers the plant's turbine.

The MITI officials said the initial test showed the bar is shorter in length than required and its V-shape bottom was being rocked in the steam carrying pipe.

The Takahama No. 2 Reactor, built by Mitsubishi Heavy Industries, began operation in 1975.

The reactor has three steam generators with a total of 10,164 tiny pipes.

A regular inspection in February this year found damage to 598 pipes, the officials said.

The natural resources and energy agency said defects were found in a total of 10 bars at the Takahama No. 2 Reactor.

The agency said the reactor developed radioactive leaks twice in 1985 and 1988 because of cracks in the steam generator pipes.

Kyushu Electric Power Co. said no faulty installation of the bars were found in inspection of four nuclear power plants operated by the company.

The MITI instructed the electric power industry to step up efforts for stable electricity supply during the summer when demand reaches its peak.

The two reactors are expected to remain shut down during the peak period, requiring the ministry to reexamine its electricity supply program for the summer.

The Federation of Electric Power Companies expressed extreme regret over the accident at the Takahama plant and said it will make the utmost effort to ensure safe operations of atomic power plants.

**NORTH KOREA****U.S.'Team Spirit' Joint Military Exercises Criticized****'Test Nuclear War' Alleged***SK1303120891 Pyongyang KCNA in English 1029 GMT 13 Mar 91*

[Text] Pyongyang March 13 (KCNA)—NODONG SINMUN today comes out with a signed article entitled "'Team Spirit' and Nuclear War Commanding System."

The paper says: The "Team Spirit" joint military maneuvers staged by the U.S. imperialists against the northern half of Korea are a test nuclear war in every respect.

Suffice it to review the commanding system of the maneuvers.

The "Team Spirit" involves many nuclear war commanding and early warning planes.

From 1987, the U.S. imperialists included in this war game "E-4B" aboard which the U.S. President and his

assistants are to command a nuclear war in case the nuclear war headquarters is destroyed.

The "E-3A" AWACS plane commanding the U.S. troops and the South Korean puppet army, "EC-135" called "commanding office in the sky," "OA-10" control planes and strategic and tactical reconnaissance planes are also involved.

Electronic jamming planes are mobilized in the war game to paralyze our commanding system. The U.S. imperialists intend to make a forestalling nuclear strike at the northern half of Korea by mobilizing all means of commanding nuclear war in the "Team Spirit."

They have mobilized in this annual war game since 1983 the U.S. Strategic Command for nuclear war.

The U.S. Strategic Command puts 60 percent of the U.S. Air Force on "quick reaction alert" and keeps 100 percent of units in "war preparedness" to fire nuclear weapons within one minute after an order comes.

The U.S. imperialists invest the local U.S. commander with the power to start a nuclear war on the Korean peninsula

Under this situation, the "Team Spirit" held in South Korea and its vicinity may turn into a nuclear war any moment. In this case all nuclear forces under the U.S. Strategic Command may be hurled into the Korean peninsula. This would mean a worldwide thermonuclear war.

The U.S. imperialists have completed the systems of operation, command, communications and information needed for nuclear war with the Korean peninsula as the theatre. The thing left to be done is to press the button.

Facts clearly show the adventurous and offensive nature of the "Team Spirit" as a test nuclear war.

#### **More on 'Test Nuclear' Attack**

SK1803063391 *Pyongyang KCNA in English*  
0511 GMT 18 Mar 91

[Text] Pyongyang March 18 (KCNA)—NODONG SINMUN today brands the "Team Spirit" joint military maneuvers as a combined war game for a regional war and a test nuclear war and preliminary war aimed at making a surprise preemptive attack on and overpowering the DPRK either in view of the armed forces and equipment involved in the game or in view of its background and nature.

The paper says in a signed article:

The U.S. imperialists reveal their invariable aggressive nature by recklessly staging the "Team Spirit" maneuvers to unleash a new war against the DPRK.

Aggression on other countries is an invariable nature and mode of existence of imperialism.

The U.S. imperialists' Korea policy is aimed at hindering the reunification of Korea, keeping hold on South Korea as a foothold of anti-communism and a forward nuclear base for an indefinite period, unleashing another war against the DPRK with South Korea as the springboard and realising their domination all over Korea. Therefore, they maintain their troops and nuclear weapons in South Korea, consolidate the colonial fascist rule and step up preparations for war against the North through frequent military maneuvers including the "Team Spirit."

The U.S. imperialists are staging various military exercises in different parts of the world and "Team Spirit" is the largest of them in scale.

The "Team Spirit" graphically shows the aggressive nature of U.S. imperialism. The U.S. imperialists, aggressive and predatory by nature, are only interested in keying up tensions and lighting the train of war on the Korean peninsula. That is why they are deadly opposed to the removal of military confrontation and the danger of war on the Korean peninsula and to the withdrawal of their forces and nuclear weapons from South Korea. Hence, they are pushing the situation on the Korean peninsula to the brink of war, while rejecting all our reasonable peace proposals to turn the Korean peninsula into a nuclear-free, peace zone, discontinue large-scale military exercises and slash the armed forces on a phased basis.

The U.S. imperialists are the very ones who render the situation strained and increase the danger of war on the Korean peninsula and the war-thirsty elements who are attempting to ignite a war against the North and inflict a scourge and calamities on our nation again.

Our people are following with heightened vigilance their reckless war provocation moves.

If they unleash a war of aggression despite our people's repeated warnings, they would have to pay dearly for it and face a stern judgement.

#### **SOUTH KOREA**

##### **Ambassador Views Japan, North, IAEA Issue**

SK2103013391 *Seoul THE KOREA HERALD*  
in English 21 Mar 91 p 2

[By staff reporter Kim Hye-won]

[Text] Japan will not give up its policy to press North Korea to sign a nuclear safeguards treaty with the International Atomic Energy Agency (IAEA). O Chae-hui, newly appointed ambassador [amb] to Japan, said yesterday.

He said the issue not only concerns the two Koreas but also is a problem for Japan and the whole world.

"I don't think Tokyo would handle the matter lightly at this time when Japan's new leadership role is more

required in Asia and the world than at any time before," Amb. O told reporters. He will leave for Tokyo next week to assume his new post.

The envoy, who was assigned to London until recently, said Seoul also does not want to see the ongoing talks on the establishment of diplomatic ties between Pyongyang and Tokyo make headway before a "meaningful progress" is made in inter-Korean dialogue.

"We don't have any objection to the talks themselves. But to have talks is one thing and to produce something through the talks is another," the 58-year-old career diplomat observed.

He said the Tokyo government has promised Seoul that it would fully take into account the "five principles" Seoul had put forth as conditions for improvement in Tokyo-Pyongyang relations. The five include the North's signing of the IAEA nuclear safeguards agreement.

"I believe that Tokyo is sharing Seoul's view that Pyongyang should be induced to open itself and to become a responsible member of the international community," said O, a brother-in-law of Prime Minister No Chae-pong.

Communist North Korea signed the international nuclear nonproliferation pact, but refused to sign an international safety standards agreement. The regime is suspected of attempting to produce nuclear weapons. Military experts in and out of Korea have warned that North Korea will be capable of making nuclear bombs in the next five years.

The ambassador said he hopes Japanese Emperor Akihito will visit Seoul "in the not too distant future" to consolidate the relations between the two countries.

"President No Tae-u has already invited him to visit Seoul when he visited Tokyo last year. The two governments would decide the timing of his Seoul visit after full consultations," he said.

To develop the Seoul-Tokyo relationship to a "future-oriented" one, he observed, a fundamental change is needed in the people's way of thinking.

"We should not bind our thinking to the unfortunate past involving the two countries any more in order to develop a new relationship which fits the coming 21st century," O said.

Asked to comment about reports that Japan was considering dispatching members of the Self-Defense Force to the Gulf as a U.N. peace-keeping mission, O avoided a clear-cut answer. He said he believed that the matter should be approached with prudence.

"If the government takes a stand on that matter, I'll put that to use," he said.

As ambassador to Japan, he said, he would also exert efforts to help the Koreans in the country live comfortable lives as full members of society without any discriminations.

Although legal discriminations are expected to be abolished to a considerable extent soon by the agreements reached between the two governments, many social limitations still exist against Koreans living in Japan. They are mostly descendents of the Koreans who were taken to Japan for forced labor during World War II.

O joined the Foreign Ministry in 1957 after passing a government test for higher diplomatic positions. He was ambassador to Pakistan and vice foreign minister.

### DPRK-Cuba Contract for Missiles Export Alleged

SK2003033291 Seoul CHOSON ILBO in Korean  
20 Mar 91 p 2

[Text] The authorities concerned said on 19 March that North Korea appears to have signed a contract with Cuba to export missiles and other anti-air weapons.

The authorities also said that a North Korean military delegation, led by Chief of Staff Choe Kwang, signed a military cooperation agreement with Cuba on 10 March and visited a genetic-bioengineering institute, along with the commander in chief of the Cuban Antiaircraft Defense and Revolutionary Air Force, to facilitate exchange of chemical warfare technology.

The authorities believe that North Korea discussed the purchase of Cuban crude oil and grain during this trip, in view of the fact that when visiting Thailand last November, a North Korean military delegation led by North Korean Minister of People's Forces O Chin-u conducted negotiations to buy rice from Thailand.

### Nuclear Research Group Signs Pact With French

SK1103101891 Seoul YONHAP in English 0935 GMT  
11 Mar 91

[Text] Seoul, March 11 (YONHAP)—The Korea Atomic Energy Research Institute (KAERI) and France's Commissariat a l'Energie Atomique (CEA) have signed an agreement on joint research in the safety of pressurized water reactors, a KAERI spokesman said Monday.

"Under the agreement, signed by KAERI President Han Pil-sun and French Ambassador Hubert de la Fortelle, on behalf of CEA, on Friday, we will directly participate in CEA's large-scale research and test projects during 1991-1997 and get sophisticated technology related to safety of pressurized water reactors," he said.

"KAERI and two French institutes under the CEA umbrella will especially concentrate on joint tests on design basis accident and fission product release during accidents involving pressurized water reactors in 1991-97."



Two KAERI researchers will be sent to France for the tests.

Korean nuclear researchers have so far done safety tests on parts of nuclear power plants such as the reactor and containment in cooperation with U.S. experts.

Some experts predict the KAERI-CEA agreement will contribute to the enhancement of the safety of nuclear power plants economically since KAERI may use the results of the CEA large-scale research tests in return for 1 percent of the total research costs.

#### **Patriot Missiles Ruled Out for Scud-B Defense**

*SK1903095391 Seoul YONHAP in English 0810 GMT 19 Mar 91*

[Text] Seoul, March 19 (OANA-YONHAP)—Scud-busting Patriot anti-missile missiles, made famous in the Gulf war, are unsuitable for the defense of South Korea and the country has ruled out buying any of them, a Korean newspaper said Tuesday.

The Patriot is not a practical answer to North Korea's Scud-B missiles for both strategic and economic reasons, and because of their performance, the CHUNGANG ILBO quoted an anonymous government official as saying.

The official admitted that the government had given some thought to purchasing the Patriot system to defend

against North Korea's mass-produced surface-to-surface Scuds, the vernacular paper said.

Korea would need at least 18 batteries, including three for Seoul, and six to seven battalions for the missile-killer missiles to provide complete defense against Scud-B attacks, the paper said.

One battery costs 200 million to 300 million U.S. dollars, and Korea could use the money in more economic and effective ways to improve its defense capabilities, CHUNGANG said.

With the defense budget being trimmed, Seoul finds it virtually impossible to purchase the missiles, it said.

U.S. press reports that the missiles hit 80 percent to 90 percent of their targets in the Gulf war were wrong, and the truth is that the success rate was a 50 percent to 60 percent and there was major damage from debris even when they did not miss the mark, the paper said.

North Korea was more likely to use short-range missiles than Scuds in any surprise attack on the South because their front lines are so close, the local daily said.

According to published reports based on government data, North Korea is capable of producing more than 50 Scud-B missiles a year and has at least 12 launchers stationed near the truce line. They are reportedly capable of carrying nuclear or chemical warheads.

**BULGARIA****Kozloduy Reactor To Be Shut Down for Refuelling**

*AU0803134291 Sofia Domestic Service in Bulgarian  
1100 GMT 8 Mar 91*

[Text] On 1 May the No. 5 reactor of the Kozloduy Nuclear Power Plant will be shut down. (?Zhak Karava), deputy chairman of the Energy Industry Committee, announced to BTA. He explained that the reactor will be disconnected because it has to be overhauled and refueled.

The No. 5 reactor, which produces over 10 percent of the country's total electric power, will operate until the end

of March at 75-percent capacity, and during April its output will be gradually reduced in preparation for the shutdown.

The deputy chairman announced that preparations are underway to start up the No. 6 reactor, which will compensate to some extent for the shortage of electric power. If personnel problems are resolved, it is planned to connect the reactor to the power network during April. In this connection, Mr. Karava stated that Soviet workers would no longer be employed at the Kozloduy Nuclear Power Plant. Of the 120 Soviet citizens presently working there, only commissioning experts will remain.

The deputy chairman announced that because of all these problems, power cuts for one hour in every four will again have to be introduced at certain times.

## ARGENTINA

### **Iraqi Bribes in Condor 2 Missile Project Viewed**

PY0803213991 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 7 Mar 91 p 11

[By special correspondent Flavio Tavares]

[Text] The Iraqi Government made multimillion-dollar investments in Argentina between 1985 and 1989, but it is not likely that Saddam Husayn had acquired farms, mansions, or other assets in that country, investments that were reported in the Italian magazine IL MONDO.

At least, there is no clear visible evidence of that fact. If he did buy them then his front men are so well hidden and protected that it will be difficult to identify them, except through the dictator's own secret files.

What is beginning to emerge now, however, is the other side of the Iraqi multimillion-dollar investment: The corruption that Husayn sowed among government officials and some private sectors to facilitate and accelerate the development of the Condor 2 missile project. It is believed that Iraq invested between \$1.5 and \$2.2 billion in those four years during which the missile was being developed, a period that culminated with a "successful" testing in April 1989 at a secret base in Patagonia, southern Argentina.

Everything was secret. In record time (in a country where everything is slow), a consortium of private enterprises built for the Argentine Air Force the secret base called Faldia del Carmen, in the mountains of Cordoba Province. There, during the government of Raul Alfonsin, Argentine Air Force experts worked with technicians from German, Italian, and U.S. private enterprises. The contract was also secret. Alfonsin signed an "accord" with the Egyptian Government, which performed as the Iraqi front at a time when Husni Mubarak and Saddam Husayn were living their romantic "Islamic Brothers" period, an episode that broke up shortly afterward.

It is commonly said now that secrecy was possible only because the operation was lubricated with bribes and "petty cash" funds. Current Argentine Economy Minister Domingo Cavallo openly made that insinuation when he officially disclosed that secret contracts concerning the Condor 2 missile had been signed by Alfonsin and his ministers.

When he mentioned the secret accord, two months ago, Cavallo was still the foreign minister. As such, he had access to the secret protocols of which, until then, the Argentine Government had denied all knowledge. Many believe that between 15 and 25 percent of the Iraqi investments were split into many so-called secret "petty cash" funds and distributed among the different circles that had made the transaction easier.

There are doubts about whether Argentina in fact managed to export some of the missiles to Iraq following the

Patagonia tests. Defense Minister Erman Gonzalez has just said in Egypt that no missiles were exported, and thus the only lethal outcome of the project was the corruption, of which today all Argentines are suspicious, especially those who are trying to explain this ambitious program that Iraq believed to be the goose that would lay the golden eggs that would arm its armies.

### **CNEA Chief on Construction, Uranium Sales**

PY2003160691 Buenos Aires TELAM in Spanish 0004 GMT 20 Mar 91

[Text] Buenos Aires, 19 Mar (TELAM)—This evening Manuel Mondino, chairman of the National Atomic Energy Commission (CNEA), announced that work has been resumed at the heavy water plant in Arroyito. The plant, which will create some 600 jobs, should be finished by the end of this year.

At the end of an Olivos residence meeting with President Carlos Menem, Mondino, who was accompanied by other CNEA officials, disclosed to the media that in the next few days Argentina will receive the first portion of FRG banks loans amounting to 200 million Deutsche marks allocated to continue building the Atucha-2 plant.

In this regard, Mondino said that the resumption of work at the Atucha plant will create 2,500 jobs.

After noting that the president had received this news with enthusiasm, Mondino also announced that the CNEA is strongly promoting relations with Brazil, in keeping with the nuclear protocols signed by Presidents Menem and Fernando Collor de Melo in Puerto Iguacu last year.

Mondino also disclosed that negotiations are being established with India for the sale of uranium dioxide which Argentina supplies at an international level.

Mondino ended by stating that 15 tons of uranium dioxide have been exported to Europe so far this year and that he believes that sales will continue at a similar rate in 1992.

## BRAZIL

### **Government To Choose Foreign Satellite Launcher**

PY0703155691 Rio de Janeiro O GLOBO in Portuguese 28 Feb 91 p 23

[By Jose Eustaquio de Freitas]

[Text] Sao Jose dos Campos—The Brazilian Government will use its political judgment in its choice of the rocket that will, next year, launch the first data-collecting satellite to have been designed and built in the country by the National Institute of Space Research (INPE).

Considering the cost and the technological cooperation offers, the Aeronautics Ministry would rather opt for the

proposal submitted by the Soviet enterprise Glavkosmos, but will leave open the possibility of choosing the U.S. rocket Pegasus, as an example of rapprochement with the United States.

Both rockets cost approximately \$10 million each, but the Soviet proposal includes the transfer of technology. The possibility of using the Alcantara launching site (Maranhao) for the launch, and the initiation of a broad space cooperation program. The U.S. proposal is based on a system in which the rocket is launched from a plane at an altitude of 10,000 meters.

The choice of launch vehicles was the main topic of discussion at a meeting of the Brazilian Council for Space Activities held at INPE. The council will submit to President Fernando Collor de Mello a report on the proposals, but will give the government the option to decide based on the interests of Brazilian foreign policy.

According to military sources, the Soviet proposal is more advantageous, but political factors must be considered, especially in the wake of the dubious positions adopted by Brazil in relation to the Persian Gulf war. According to those sources, choosing the Soviet rocket could widen the gap between the Brazilian foreign policy and U.S. interests.

## HONDURAS

### Government's Concern Over Reports of Chemical Weapons

#### Foreign Minister Speaks

PA1203215591 Panama City ACAN in Spanish  
1543 GMT 12 Mar 91

[Text] Tegucigalpa, 12 Mar (ACAN-EFE)—The Honduran Government expressed concern today over U.S. reports which say that Guatemala, El Salvador, and Nicaragua have chemical weapons.

Honduran Foreign Minister Mario Carias told the press that "there is concern because these types of weapons introduce a different factor in the types of armaments a

country may possess." The use of chemical weapons affects "combatants, the population, and the environment," Carias said.

He added that at the next Security Commission meeting of the Esquipulas II peace accords, to be held in Managua late this month, he will ask his counterparts from Guatemala, El Salvador, and Nicaragua whether their countries have chemical weapons.

According to a U.S. Navy study, these three Central American countries are included on a long list of nations that have chemical weapons.

Honduras thinks that the use of weapons of mass destruction should be banned in Central America.

#### Guatemala Denies Possession

PA1303201091 Guatemala City EL GRAFICO  
in Spanish 13 Mar 91 p 6

[By Carlos Garcia Urrea]

[Text] Guatemala, 13 March 1991—On the afternoon of 12 March, Colonel Homero Garcia, the chief of the Information and Press Department of the Army, firmly and flatly denied that the Army has any type of chemical weapons.

The Army spokesman was asked about a report by several international news agencies, including ACAN-EFE, REUTER, and NOTIMEX. All the news agencies cited statements made by the Honduran Foreign Minister concerning information he had received from the U.S. Navy. This information indicated that Guatemala, El Salvador, and Nicaragua could have chemical weapons, and the minister expressed Honduras' concern over this.

Col. Garcia informed EL GRAFICO that perhaps the information given to Honduras refers to weapons held by the rebels and not to the regular forces (the Army). He said the United States knows exactly what types of weapons each Central American army possesses. Guatemala's weapons, he added, are very limited and the Armed Forces do not even receive military aid. The Guatemalan Army is a totally defensive one. It does not have the resources to modernize its equipment, much less buy high-technology equipment, such as chemical weapons. This would be totally out of budget, the officer asserted, unless the tear gas bombs used by the police to disperse demonstrations are considered "chemical weapons."

## INDIA

### Gandhi States Congress-I Nuclear Policy

91WD0532A Bombay THE TIMES OF INDIA  
in English 12 Feb 91 p 1

[Article: "Congress May Review N-Policy"]

[Text] New Delhi, Feb. 11. The Congress president, Mr Rajiv Gandhi, has in a letter to the Prime Minister, Mr Chandra Shekhar, stated that if the U.S. used nuclear weapons in the Gulf war, India would be left with no option "but to convert our nuclear weapons capability into nuclear weapons capacity."

The Congress position marks a major reversal in its policy on the peaceful uses of nuclear technology. It has consistently taken the stand that it would not go in for nuclear weapons and worked assiduously for disarmament.

Stating that he was disturbed by three successive statements by key U.S. authorities indicating the active consideration of the use of nuclear weapons in the Gulf war, Mr Gandhi stated that President George Bush's refusal to categorically reject the nuclear option was a reflection of the ugly phase of the emerging post-cold war international scenario.

Meanwhile, Mr Rajiv Gandhi called on the president, Mr R. Venkataraman, in Rashtrapati Bhavan this evening to brief him on the fresh position in regard to India's nuclear policy. This is his third meeting with the President in recent days. Apparently, Mr Gandhi did not want to surprise the President by his letter to the Prime Minister appearing in the papers tomorrow and felt it necessary to explain the background and the purpose behind it.

The second letter on what position the Indian delegation now in Belgrade should take at the NAM [Non-Aligned Movement] foreign ministers meeting was also discussed in the meeting.

It is also learnt that while Mr Gandhi informed the President that he did not wish to form the government or be a part of the present government, he was also not quite happy with the performance of the government on various issues like the refuelling of U.S. military aircraft and, on the domestic front, the rising prices of essential commodities.

Concern was reportedly expressed about how the government would survive in this budget session because even if Congress support was there for it, the assembly elections in Tamil Nadu likely to be held in April would result in absenteeism by members of the Lok Sabha from the southern state.

In his letter, Mr Gandhi alerted the world to the dangers of the use of nuclear weapons. "The personalised frenzy that has been whipped up against President Saddam Husayn in the West has created an atmosphere in which

large segments of public opinion have become desensitised to the horrors of nuclear war in relation to Iraq," he said.

Cautioning that India would be among the worst victims of any resort to nuclear weapons in the West Asian theatre, the former Prime Minister said: "First, the removal of the taboo at one blow would destroy mental defences against the outbreak of nuclear war that have been built up in the human mind, thanks in no small measure to Pandit, Jawaharlal Nehru and the non-aligned movement. Second, radiation and other consequences of the use of nuclear weapons in the Gulf theatre will, in all likelihood, spread to India."

Mr Gandhi pointed out that the U.S. vice president, Mr Dan Quayle had refused to rule out the possibility of the U.S. resorting to any use of nuclear weapons. Notwithstanding some clarifications by the U.S. charge d'affaires asserting that there was no question of any resort to nuclear weapons, Mr Gandhi said that a few days later, the U.S. secretary of state, Mr James Baker, was quoted as saying that he ruled out the use of nuclear weapons only "at this point of time."

"The most ominous development, however, has been President George Bush's reported statement that the U.S. reserves the right to have recourse to 'limited nuclear weapons.'"

### "Sundarji Advises Need for Nuclear Weapons"

91WD0542A New Delhi PATRIOT in English 4 Feb 91  
p 2

[Text] Bangalore, Feb 3 (UNI)—India should go in for a nuclear weapons programme as a deterrent against neighbouring nuclear powers and pave the way for equilibrium in the region, says former Chief of the Indian Army Gen Krishnaswami Sundarji.

I do believe the time has come for a deterrent. There's nothing to be ashamed of, there's nothing illegal, immoral or flattering about having a deterrent. We are not going to make first use of it, it is going to be a defensive capability. Only if the other guy is stupid enough to use it against us first, we will hit him back. But nobody can afford to fight under these circumstances, he told UNI.

He said the country was concerned about developing a deterrent since the time China exploded its first nuclear device in 1964. But this could not be achieved because the country lacked the right delivery means till such time as the missile Agni was tested, there was no vector for the weapon, and so the minimum deterrent could not be constituted.

Gen Sundarji said the time-frame appropriate would have been yesterday for the country to adopt the minimum nuclear deterrence philosophy. In my view, Pakistan already has the capability (nuclear). If you are waiting for Pakistan to come and tell you that, then you



can keep waiting, he added. However, it must be a policy decision taken with a degree of consensus.

He said a nuclear weapon was a great leveller in strategic terms. Even if one could damage a handful of cities on the other side after absorbing the effects of first strike, that's enough deterrence. That's why I say minimum deterrence vis-a-vis China is viable, China's minimum deterrence vis-a-vis the Soviet Union and the USA is viable and Pakistan's minimum deterrence vis-a-vis India is viable.

Gen Sundarji has expressed concern over the slow progress in the probe into the pay-offs in the Bofors Howitzer Gun deal.

"It's unfortunate that the delays are taking place. The news that they are waiting for the Supreme Court judgment is disappointing," he told UNI. (The Geneva cantonal court has said it would decide on the transfer of secret Swiss papers to India after the Supreme Court decides on the legitimacy of the First Information Report.)

"I only hope that the truth comes out of it so that we get out of this cynical mind-set in which we are at the moment," he added.

Gen Sundarji said he was not suggesting that corruption was unique to the country. But it does not mean that we could be callous about the whole thing. At least the old people were ashamed of it. Now we are not only thick-skinned, we are wearing it like badge.

At the other extreme, he said if somebody were honest, he was being called a fool. Do you want us all to be so cynical to accept that this is the normal way of life? That will be a sad day, he said.

He said he could only pray twice a day and nurse a pious hope that the names of the recipients would come to light.

Asked if he felt the process was being dragged, Gen Sundarji said "I don't know. We have come to a stage where we cannot trust any politician. Everybody seems to have an angle on this one way or the other."

He said he would not accept any post plum or otherwise offered by the Government. I have indicated that I am not interested in anything offered by any government. I am perfectly happy as I am.

### **BJP Advocates India Going Nuclear**

91WD0534A Bombay THE TIMES OF INDIA  
in English 13 Feb 91 p 3

[Article: "India Should Go Nuclear: BJP"]

[Excerpt] New Delhi, February 12. The Bharatiya Janata Party (BJP) today said the country could go in for a nuclear weapon by national consensus without wasting any more time, reports PTI.

Referring to Mr. Rajiv Gandhi's letter to the Prime Minister, Mr. Chandra Shekhar, suggesting that the nuclear policy be reviewed and the country go in for nuclear weapons, the BJP said Mr. Gandhi could have done this five years ago but did not do so.

Since the Jana Sangh days, the BJP had always pleaded for nuclear arms and this demand has been there for the last three decades, the BJP all India secretary, Mr. J. P. Mathur, said in a statement.

He described Mr. Gandhi's suggestion coming now as "jerky and ad hoc" and said this was not the first time that Mr. Gandhi had called for reviewing the nuclear policy.

Mr. Mathur said that five years ago when Pakistan was furiously pursuing its efforts at making the bomb, Mr. Gandhi had talked of reviewing India's nuclear options. But, he (Mr. Gandhi) never did.

Mr. Mathur said governments run by Congress members and ex-congress members "didn't have the guts and vision to go nuclear." He said the former chief of army staff general, Mr. K. Sundarji, too had seen the wisdom of going nuclear. [passage omitted]

### **Proposal To Sell Equipment Explored**

91WD0558A Bombay THE TIMES OF INDIA  
in English 7 Mar 91 p 7

[Text] New Delhi, 6 Mar (PTI)—India proposed to sell equipment, radioisotopes and services to other countries for the peaceful application of nuclear energy.

Stating this in Rajya Sabha in a written reply to Mr K.K. Birla, the minister of state, Mr Kamal Morarka, said a few countries had explored possibilities of taking India's assistance in the development of their nuclear technologies.

The International Atomic Energy Agency (IAEA) had also evinced interest in various nuclear instruments and equipment developed in this country, the minister said.

India was now capable of expanding its nuclear power programme for enhancing the total quantity of electricity generated from nuclear resources. The country had already demonstrated self-sufficiency in nuclear technology in a wide spectrum of areas, Mr Kamal Morarka said.

He said that it appeared Pakistan was making efforts to achieve a greater degree of self-reliance in its nuclear programme by setting up an enrichment plant, operating a five mw research reactor at Islamabad and a 125 mw nuclear power plant at Karachi and setting up plants for upgradation of heavy water and fuel fabrication, although it was not in a position to construct its own nuclear power reactor.

India was producing 1500 mw of nuclear power from its seven nuclear power reactors operating and as many power reactors were already under construction for production of electricity from nuclear resources, he added.

### Scientist Says Plutonium Answer to Energy Crunch

91WD0533A New Delhi PATRIOT in English  
12 Feb 91 p 2

[Article: "Plutonium 'Real Answer' to Energy Crunch"]

[Text] Bombay, Feb 11 (UNI)—The Indian scientific community believes that plutonium technology is the "real answer" to the energy crunch the country is facing especially because of the Gulf war.

Atomic Energy Commission (AEC) chairman Dr. P. K. Iyenger said at a symposium here recently that though complex in nature, the entire technology, starting from production of plutonium in reactors, and its isolation and utilisation as fuel in power reactors had been indigenised. All types of nuclear fuels containing plutonium, had been extensively investigated and fabricated in India, he said.

According to Bhabha Atomic Research Centre (BARC) scientists, plutonium-based breeder in India has the capacity to provide more than 3,50,000 MW of installed capacity, which through thorium could be used to produce reliable electric power for many centuries.

The BARC scientists foresee a rapid growth in nuclear power during the next 50 years, with the safe and reliable operation of Fast Breeder Test Reactor (FBTR) and the installation of Prototype Fast Breeder Reactor (PFBR).

Notwithstanding the environmentalists reference to plutonium as "Bargain with the devil" for the energy-starved world of today, this man-made element has come to represent the hope for future, because the accumulated fissile inventory is equivalent to millions of tonnes of oil or coal in terms of its energy content.

The very concept of utilising our vast resources of thorium depend on the very special breeding property of plutonium, according to the BARC scientists. Breeder reactors using plutonium fuel not only produce energy.

### Government Denies Possessing Chemical Weapons

BK1103144491 Delhi Domestic Service in English  
1430 GMT 11 Mar 91

[Text] India has denied a report appearing in a section of the press that it probably possessed chemical weapons. An External Affairs Ministry spokesman said in New Delhi today that the report is baseless.

### IRAN

#### Spokesman Affirms 'Right' to Chemical Weapons

LD1403152791 Tehran IRNA in English 1422 GMT  
14 Mar 91

[Text] Tehran, Mar. 14, IRNA—A senior Iranian official on Thursday stated that Iran should have the capability

for neutralizing the destructive effects of chemical weapons, in view of the access of its neighbours to such lethal arms. "More studies and research is needed on ways of averting the use of chemical weapons and neutralizing their effects," Hoseyn Firuzabadi, chief of the Armed Forces Command Headquarters said.

Firuzabadi was speaking at a seminar to study effects of chemical arms and chemical agents, held in memory of the victims of the Iraqi Government's chemical attacks during the 8-year war especially on the Iraqi town of Halabjah and the northwestern Iranian town of Sardasht. "Iran's border areas were attacked with toxic arms 400 times by Iraq during its war against the Islamic Republic, and the crime claimed a large number of civilians and combatants as victims," he said. "The chemical arms used by Iraq included hand grenades, mortar and artillery shells, bombs and rockets, filled with mustard, suffocating and sometimes nerve gases," added Firuzabadi. The Iraqi chemical attack on Sardasht, he recalled, wounded 7,000 people, while some two years before that 30,000 Iranian combatants were chemically wounded in the southern fronts during the "Val-Fajr-8" operations on February 10, 1986.

On the chemical arms potential of Iran's neighbours and the superpowers, and the threats they could pose to the country, Firuzabadi pointed out that "the U.S. naval fleets in the Persian Gulf are equipped with chemical arms. Iraq possesses them (chemical arms). Turkey has access to such arms because of its membership in NATO. The Soviet Union has large stockpiles of chemical agents. Afghanistan because of its dependence on Moscow has got these arms and used them against the mujahideen...."

Elsewhere in his speech, Firuzabadi regretted that none of the countries who are signatories to international conventions banning the use of chemical weapons had condemned Iraq for its chemical attacks on Iran. He insisted on research and said "therefore, we reserve the right for ourselves to get technological knowhow necessary to confront the chemical agents our enemies might use against us."

### PAKISTAN

#### Official Claims U.S. May Relax Nuclear Stance

BK1003092491 Hong Kong AFP in English 0911 GMT  
10 Mar 91

[Text] Islamabad, March 10 (AFP)—The United States may soften its stance on Islamabad's nuclear program following its victory in the Gulf war, the head of Pakistan's Atomic Energy Commission said.

"I believe that after winning the Gulf war the U.S. Administration is also in a better position to make a deal" with Pakistan, Munir Ahmed Khan said in an interview published Sunday by the daily THE NEWS.

Mr. Khan reaffirmed that Islamabad "will not accept any discriminatory restrictions on our programme which are not applicable to India," adding, "the Americans know that no government in Pakistan can survive if it compromises on these fundamental aspects."

Washington, suspecting Islamabad of resuming production of enriched uranium for military uses last year during tensions with India over disputed Kashmir, on October 1 suspended its annual aid of about 600 million dollars to Pakistan.

Under a U.S. law introduced by South Dakota Senator Larry Pressler, the aid cannot be released unless U.S. President George Bush certifies to Congress that Pakistan is not building a nuclear weapon. "For political reasons the Americans want to redefine the interpretation of the Pressler Amendment" to include components that might be used for making a nuclear weapon as well as completed weapons.

"We reject this interpretation" because it would mean a halt to "all technological activities" including nuclear research, "a position which is unacceptable to us," Mr. Khan said. "There has been no change in our nuclear programme. It is the American perceptions about the region that have changed," he added, referring explicitly to U.S. "strategic interests." "We say we are not making a nuclear weapon, though we retain the option to do so as long as the Indians have (this option)," Mr. Khan said.

The two rivals have fought three wars since the partition of the Indian Subcontinent in 1947. They reached the brink of their fourth conflict, which would have been the third over Kashmir, last year.

Mr. Khan said he was certain that Pakistan would sign an accord with China before the end of the year to build a 300 megawatt nuclear power station. He said he hoped Islamabad and Paris would resume dialogue on plans for a 900 megawatt station mooted by French President Francois Mitterrand during a visit here in February 1990.

#### **Solarz Remarks on Nuclear Program Derided**

*BK1103093191 Islamabad THE MUSLIM in English 11 Mar 91 p 4*

[Editorial: "The Latest Bait"]

[Text] Stephen Solarz, Chairman of the House Foreign Affairs Sub-Committee, has been at it again. He has always been at pains to express his concern for Pakistan's welfare and, true to form, he said on Thursday [7 March] that Pakistan security interests could best be guarded through close ties with the U.S. He added that this could only be ensured by Pakistan's willingness to abide by the requirements of the Pressler Amendment. Do that, he has advised, and it will open the doors for resumption of U.S. aid as well as U.S. close ties with Pakistan with the

blessings of Congress. The question which comes immediately to mind after the exhibition of so much benevolence by Mr Solarz is, why was it necessary to invoke the Pressler Amendment against us as late as October 1, 1990, while it stands to reason that our nuclear programme, if we do have one, must have taken years to reach a stage where it could have caused so much concern and apprehension in the minds of the powers that be in Washington. Why then an aid cut-off as belatedly as it was effected?

Our rejoinder to Mr Solarz's concern about our nuclear capability is that he should mind his own business. What he has more than implied is that if we are desirous of receiving U.S. aid (peanuts at that), we should give up whatever plans we have chalked out for the peaceful use of nuclear energy. Nobody in his right mind can deny us the right to manage our own affairs without undue interference and unsolicited advice from the likes of Stephen Solarz. It is exclusively for us to decide our course of action. In any case, this country cannot be expected to barter away its sovereignty for the paltry amount of aid the U.S. has been offering. With the situation created by the U.S. and its allies in the recent developments in the Middle East, we would certainly not like to be drawn into the net in which certain Arab states have been enmeshed to further Western imperialist and hegemonistic designs in the region. Finally, Pakistan will never allow itself to be coerced by the U.S. into recognizing the Israeli entity.

#### **Japanese Envoy Urges Nuclear Treaty Signing**

*OW1103114891 Tokyo KYODO in English 1037 GMT 11 Mar 91*

[Text] Islamabad, March 11 KYODO—Japanese economic assistance to Pakistan will continue despite the termination of U.S. aid but Pakistan should sign the nuclear weapons nonproliferation treaty to make things easier, Japan's ambassador to Islamabad told reporters Monday. The United States suspended its military and economic assistance to Pakistan last October because of Islamabad's nuclear program.

Ambassador Kunio Muraoka said Tokyo also wants friendly countries to adhere to a policy of nuclear non-proliferation, but that Tokyo is not prepared to use aid as a lever to achieve the objective.

Asked if Japan would be willing to sell a nuclear power plant to Pakistan if it agrees to sign the nuclear nonproliferation treaty, he said Pakistan's signature of it would completely alter the situation and that U.S. firms would also step forward if Pakistan signs on.

#### **PAEC's Nuclear Capability Reviewed**

*BK0703145791 Islamabad THE PAKISTAN TIMES in English 6 Mar 91 pp 4, 6*

[Article by Munir Ahmed Suleri: "Capabilities and Potentials of PAEC"]



[Text] PAEC [Pakistan Atomic Energy Commission] has brought immense economic, technological, industrial and agricultural benefits to the nation. Despite embargoes and restraints on the supply of spare parts and nuclear materials, KANUPP [Karachi Nuclear Power Plant] had already generated over five billion kilowatt hours of electricity. PAEC's agricultural research institutes developed 13 new varieties of cotton wheat, rice, and mungbean through nuclear techniques. These new varieties have added over 300 million [not specified] to the national economy each year. NIAB-78 [Nuclear Institute of Agriculture and Biology] had ushered in cotton revolution in the country and given an impetus to local textile industry.

Similarly at its nine nuclear medical centres, PAEC has been handling more than 1,65,000 [as published] patients every year through provision of cancer treatment and diagnostic services. The local industry has likewise been helped and over 500 quality control specialists trained by PAEC. The Commission had set up a number of training institutes such as the Centre for Nuclear Studies (CNS), Karachi Nuclear Power Training Centre (KNPTC) etc., to satisfy growing requirements of high quality manpower in nuclear engineering, computer applications, nuclear power plant operations and nuclear medicine hundreds of specialists had been trained by PAEC in these important disciplines at M.Sc. level. The nuclear engineering programme has been expanded to Ph.D. level. The Commission works closely with the University Grants Commission in training of students and teachers.

Prior to Mr. Munir's induction in the office of Chairman, the Commission had a strength of merely 150 scientists and engineers in all establishments of PAEC. Today, there is a contingent of about 2,000 scientists and engineers. As a matter of fact, a comprehensive overall nuclear programme was approved in 1972 which is being pursued ever since.

However, India's nuclear explosion in 1974 caused a great setback to the peaceful application of nuclear energy throughout the world especially in the developing nations against whom restrictions were placed on any further sharing of nuclear technology. Pakistan was particularly made a target of discriminatory treatment and a number of treaties and contracts with Pakistan even under international safeguards and controls were cancelled. The unilaterally broken contracts included those for a fuel fabrication plant, a reprocessing plant and a heavy water plants. All supplies of nuclear fuel, heavy water and spare parts were cut off for KANUPP in 1977 turning its operations problematic and challenging. The PAEC scientists and engineers had acquitted themselves very well by continuing to operate this plant safely for the past 16 years.'

For this purpose, the PAEC established a full-fledged Atomic Energy Minerals Centre, Lahore, charged with the duty of uranium resource development. It means that

this Centre is responsible for the gigantic task of prospecting exploration and analysis of all types of nuclear minerals. In other words, the PAEC had to develop its own uranium mines and learn to purify the uranium and fabricate nuclear fuel for KANUPP in accordance with the international standards.

The first fuel bundle for commercial power reactor was fabricated in December, 1978, when Pakistan joined 12 countries in the world in its fabrication. Uranium is mined, processed, and refined by PAEC scientists and engineers under the able guidance of Mr. Munir Ahmad Khan. Since, then, thousands of fuel bundles for KANUPP were fabricated without a single failure so far.

The country has the largest research and development facilities in nuclear field i.e. the Pakistan Institute of Nuclear Science and Technology (PINSTECH, Nilore) in the entire Muslim world and happen to be the second largest in the whole of Third World.

Pakistan has achieved mastery over the front end of nuclear fuel cycle and is at present carrying out research in advanced fields like lasers, computers and new material required for nuclear application.

PAEC now possess the capability to design and build its own reactors which is indicated by the replacement of the old reactor at PINSTECH by a new and more powerful one. A consortium of major industries has been set up to manufacture nuclear reactors within the country. The consortium is working under the guidance of PAEC.

The PAEC will produce first reactor which would be a bit more expensive than the one brought from international market. However, the mass domestic production of nuclear reactors by the consortium would be very economical, and a reactor costing about \$1000 million in international market would be ready for just one quarter of it.

The mass production of nuclear reactors would give the country many additional benefits. The quality of the thermal power plants, fertilisers, cement, textile and other industrial units would improve tremendously, raising the overall standard of industries. These "by-products" will be more valuable than even the nuclear reactor itself. It is estimated that Pakistan will be able to generate some 6000 megawatts of nuclear power through domestically produced and imported power plants by 2009.

During Mr. Munir's tenure, the scientists and engineers succeeded in manufacturing a small research and training reactor of 27 KW capacity set-up at PINSTECH. This is the second reactor set up at PINSTECH. The PAEC redesigned the first research reactor of 5mw supplied by the United States and has recently increased its capacity to 10mw. The relevant equipment of the reactor has been produced locally.

Foreign experts of international repute are of the opinion that for a country like Pakistan, which does not possess much resources and which has the capability to redesign a reactor, it is a big achievement and will help it in its future nuclear power related projects. In order to reduce the cost of fuel used in a nuclear reactors the PAEC is considering various enrichment techniques, other than the centrifuge method, being employed by other countries. At present Brazil, Australia, Japan, France, the US, the Soviet Union and Holland can enrich uranium through centrifuge method but some of them have abandoned the same for various reasons. They are now switching over to uranium enrichment through laser and this method would be common in the next decade. This technology is expected to reduce the cost by one half and PAEC is making strenuous effort to develop this technology for the purpose.

PAEC has manufactured laser range finders which are used to measure distance of various enemy targets so that they could be hit precisely without wastage of extra ammunition.

PAEC has set up a laboratory, the first of its kind in Asia and one of the few in the world, to determine the site suitability. The laboratory is located at Lahore. Public and private sectors are using the facility of "SILICON" for their projects. A dynamic testing costing between Rs. 50,000 and Rs. 60,000 abroad will be possible at SILICON only for Rs. 25,000 to Rs. 30,000.

The Commission has also developed biological techniques for economically utilising saline land and established a biosaline research laboratory along with a demonstration farm near Lahore. The techniques evolved at this laboratory are being practised by progressive farmers. Large tracts of saline land can be converted into livestock farms to meet export of meat and meat products. With the commissioning of gamma irradiation plant named Pakistan Radiation Services, Lahore (PARAS), Pakistan's first commercial plant for gamma sterilisation of medical products like bandage, disposable syringes, etc. gloves, etc. Casualties due to infection will be reduced drastically thus ensuring better public medical care.

The Commission has also developed techniques for preservation of food and other products, whose application could enable export of the surplus. The export of irradiated products of certain kinds has already been internationally approved for marketing.

The delay in the installation of nuclear power stations was mainly due to the hostile attitude of the supplier States. The USA has always singled out Pakistan for discrimination in nuclear field. The US economic and military aid to Pakistan has been cut off for the year 1990-91. The authorities in America contend that the US President is not entirely satisfied that Pakistan is pursuing a peaceful nuclear programme. He therefore, has not certified to the US Congress that Pakistan

nuclear programme is peaceful. It was not justified even under the Pressler Amendment.

However, there is total public consensus on our nuclear policy as it reflects needs and aspiration of the nation. That is why governments after governments have been following it. Our elected Prime Minister, Mian Nawaz Sharif, has declared on more than one occasion that aid or no aid, we will pursue our peaceful nuclear programme because it serves our best national interest.

Anyway, the recent agreements reached with France and China for installation of a 950mw and 300mw nuclear plant, respectively represented an important breakthrough. They would be built with the maximum participation of PAEC engineers and scientists and local industry which would go a long way to increasing our expertise in construction and safety of such plants. This way, by the end of the 1990s Pakistan would be in a position to undertake building of locally designed nuclear power.

The person behind the curtain, making valuable contribution silently, is Mr Munir Ahmad Khan. It was his realisation that PAEC actually first started the Kahuta projects in February, 1975.

It was then under the charge of an equally competent and renowned engineer, Syed Bashiruddin Mahmood, whose engineering inventions have been patented in Canada and Europe under his name as SBM probes.

Why and how he and his boss Munir Ahmad Khan were booted out of the projects is a different story which may be told later by those who know.

However, it is a worst kind of aspersion to assert that Mr Munir Ahmad Khan and PAEC have failed in the achievement of the objectives particularly in training manpower in various important disciplines. Only the PINSTECH is staffed with more than 1,500 first-class scientists and engineers who may be favourably compared with foreign scientists and engineers of repute who have achieved nuclear autarchy.

It is advisable that in larger national interest, while dealing with the nuclear issue, utmost restraint and care should be exercised so as not to give ammunition to our critics abroad to undermine our nuclear programme. We have suffered a great deal due to discriminatory regulations and embargoes. We should learn from India, Israel and South Africa who seldom played up or played down their nuclear weapon capability and yet continued receiving nuclear cooperation from advanced countries. We should refrain from criticising our sensitive establishments like PAEC.

#### **Khan Stresses 'Nuclear Technology at All Costs'**

91AS0657Z Karachi DAWN in English 21 Feb 91 p 6

[Text] Lahore, 20 Feb (AFP)—Pakistan is determined to acquire nuclear technology for peaceful purposes even

without foreign aid. The refusal of aid to Pakistan would not deter it from pursuing its goal.

This was stated by Mr Munir Ahmad Khan, Chairman, Pakistan Atomic Energy Commission [PAEC], while delivering a lecture on Pakistan's nuclear programme and policy, organised by Pakistan Institute of National Affairs, here.

He, however, said Pakistan did not possess nuclear weapons nor did it intend to manufacture one.

The function was presided over by Punjab Governor Mohammad Azhar and attended by scientists and scholars.

Tracing the background of Pakistan's quest in the nuclear field from 1972, when a comprehensive programme for acquiring nuclear energy for peaceful purposes and economic development was formulated, he said that the nuclear policy for peaceful purposes enjoyed the full backing of the people of Pakistan. This programme suffered a serious setback right in the beginning when in 1976 American Secretary of State Henry Kissinger warned that the United States would make a horrible example out of Pakistan if it did not desist from pursuing its nuclear programme. As a result of the American pressure, he said, French Government cancelled the deal for selling nuclear reprocessing plant to Pakistan despite it being an international agreement.

He said PAEC, however, continued its strenuous efforts and produced the first 'yellow cake' from the indigenous uranium rocks. He said PAEC was able to make the first 'fuel bundle' used in N-reactors in 1978. He said when Pakistan fabricated the first N-fuel bundle, no developed country was ready to testify it even at a high cost. He said Pakistani scientists, however, fabricated fuel bundle with such a precision that none had so far failed, though thousands had so far been used at Kannupp in Karachi.

The PAEC Chairman said that the only way to tackle the proliferation problem in South Asia was through a regional approach instead of singling out Pakistan.

Pakistan, he said, had been advocating for the establishment of a nuclear free zone in South Asia for the last 18 years and had made a number of other proposals to strengthen the non-proliferation treaty for the region in order to forestall a nuclear arms race.

He regretted that India had not so far responded positively to Pakistan proposals. He said it was good that recently there was realisation on the part of the United States that the nuclear proliferation issue in South Asia demanded a regional approach. He said Pakistan would support any action to find a regional solution to the nuclear issue.

Referring to the suspension of U.S. aid under the pretext of Pakistan going nuclear the PAEC Chairman regretted the U.S. administration's decision and said it was totally unjustified even under the Pressler Amendment. "If the U.S. President could certify to the Congress in October

1989 that Islamabad did not have a nuclear device then there should have been no difficulty in doing the same in October 1990 as nothing had changed in the status of our nuclear programme," he asserted.

Mr Munir Ahmad Khan reiterated that Pakistan would never compromise on its peaceful nuclear programme which had already brought immense economic, technological, industrial and agricultural benefits to the nation.

Recounting the PAEC achievements, he said despite embargoes on spare parts and nuclear materials Pakistan had already generated over five billion kilowatt hours of electricity from Kannupp, developed 13 new varieties of cotton, wheat, rice and mungbean through nuclear techniques. These new varieties, he said, were adding over 30 million to the national economy each year and only Niab-78, a new variety of cotton, had ushered in a cotton revolution in the country and given impetus to local textile industry.

Similarly, at its nine nuclear medical centres, the Pakistan Atomic Energy Commission was handling more than 1,63,000 patients every year by provision of cancer treatment and diagnostic services.

The local industry had likewise been helped and over 500 quality control specialists trained by the PAEC were employed. He pointed out that the Commission had set up a number of training institutes to satisfy the growing requirements of high quality manpower in nuclear engineering, computer applications, nuclear power plant operations and nuclear medicine. He said hundreds of specialists had been trained by the PAEC so far in these important disciplines at the M.Sc level.

Giving an assessment of Pakistan's current nuclear status, the PAEC Chairman said the country had the largest research and development facilities in the nuclear field in the entire Muslim world and it happened to be the second largest in the whole of the Third World.

He said Pakistan had achieved distinction over the front end of the nuclear fuel cycle and was presently carrying out research in advanced fields like lasers, computers and new materials required for nuclear application. Pakistan, he added, now possessed capability to design and build its own research reactors which was indicated by the replacement of the old reactor at Pinstech by the new one having double production capacity.

The recent agreements reached with France and China for installation of a 950 MW and 300 MW nuclear plants, he said, was an important breakthrough. He said the proposed plants would be built with maximum participation of the PAEC engineers and scientists and local industry which would increase local expertise in the construction and safety of such plants.

Mr Munir Ahmed Khan also cautioned that while dealing with the nuclear issue, utmost restraint and care should be exercised so as not to give ammunition to critics abroad to attack and undermine Pakistan's

nuclear programme. "We have suffered a great deal due to discriminatory regulations and embargoes," he remarked adding that "we should learn from India, Israel and South Africa, who seldom played up their nuclear weapons capability and yet continued to receive nuclear cooperation from the advanced countries." He stressed that the world public opinion was very sensitive at present, about nuclear weapons. He said no pretexts should be provided to them to condemn Pakistan's peaceful nuclear programme.

### Politician Urges Nuclear Bomb Explosion

91AS0657Y Karachi DAWN in English 21 Feb 91 p 11

[Article by Anis Mirza]

[Excerpt] Islamabad—Kasur politician Sardar Asif Ali was the main speaker when the National Assembly resumed its debate on the Gulf situation. The attendance was poor and the ministerial benches were almost empty. Asif spoke in his proverbial urbane manner, his voice maintaining its even monotone. Professorial in style, his extended extempore address was delivered *sans* flashes *sans* emotion.

In the first phase of his oration, he urged Pakistanis not go overboard and call Saddam Husayn a hero, but view his dictatorial personality and his ruthless policies at home and abroad. In the second part of his analysis, Sardar Asif warned that it was time for Pakistan to redefine its foreign policy options and explode the nuclear bomb, "India has started on a weapons programme. Pakistan is left with no options but to have a nuclear test." Silence swept over the assembly hall. [passage omitted]

## SYRIA

### Pro-Regime Forces Said Using Chemical Weapons

NC0903194191 Damascus SANA in Arabic 1730 GMT 9 Mar 91

[Text] Damascus, 9 Mar (SANA)—Ayatollah Muhammad al-Mudarrisi, spokesman for Iraq's Islamic Action Organization, has called for an emergency session of the UN Security Council to look into the Iraqi regime's attempts to liquidate the defenseless Iraqi people and destroy what remains of the country's capabilities and institutions.

A memorandum sent by al-Mudarrisi to the UN secretary general and the UN Security Council members said: Because of the gravity of the situation in Iraq and in the name of the Iraqi people who are on the receiving end of killing and devastation by the head of the Iraqi regime, I am calling for convening an emergency session of the Security Council so that it can pass a resolution to keep the Iraqi regime from pursuing its genocide of the Iraqi people, who are demanding the departure of the head of this regime and an end to his dictatorship.

Reminding the international community of the Iraqi regime's practices in Kuwait during its occupation of that country, al-Mudarrisi presented these atrocities as an example of what it is doing now and what it has done on a larger scale in Iraq for the past 22 years.

He emphasized the Iraqi people's determination to topple the present regime which has obstructed Iraq's civilized role.

Engineer Bayan Jabr, director of the Damascus branch of the Supreme Assembly of the Islamic Revolution in Iraq, announced earlier that the pro-Iraqi regime's forces used chemical weapons against the population of al-Najaf and al-Kafal [placename as received], inflicting many casualties.

He said in a statement today that the Iraqi regime's forces were thwarted in their attempts to seize al-Hillah and al-Amarah by forces of the popular uprising, who forced them to flee leaving behind heavy and light weapons.

He announced that the 7th Border Brigade under Major General Khalid 'Abid Ibrahim had joined the uprising forces, as had the intelligence battalion of the 7th Corps and some missile battery commanders in al-Basrah.

Ayatollah al-Mudarrisi said earlier today that forces of the popular uprising had taken over the al-Basrah broadcasting station and were now operating it after completing the necessary repairs.

Al-Khalisah, which lies near al-Kut, is now completely under the control of the people, and several units of the Republican Guard sent to suppress the public have joined the popular forces.

He disclosed that 10,000 soldiers of the Republican Guard have joined the ranks of the popular forces in al-Najaf, and pointed out that al-Sulaymaniyah and al-Qarraniyah in northern Iraq have fallen to the popular forces.



### PRC Envoy Hands Over N-Treaty Accession Document

PM1103124191 Moscow IZVESTIYA (Union Edition)  
in Russian 7 Mar 91 p 4

[Unattributed report: "Deposited"]

[Text] PRC Ambassador to the USSR Yu Hongliang has deposited with the USSR Government a document on the PRC's accession to the 11 February 1971 Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Seabed and the Ocean Floor and in the Subsoil Thereof.

The aforementioned document was accepted on behalf of the USSR Government by I.A. Rogachev, USSR deputy minister of foreign affairs.

### Envoy Submits Statement on Nuclear Arms Treaty

OW0703220291 Moscow International Service  
in Mandarin 2200 GMT 6 Mar 91

[Text] Yu Hongliang, the Chinese ambassador to the Soviet Union, has submitted a statement to the Soviet Government for safekeeping, declaring that China joined a treaty signed on 11 February 1971 banning the installation of nuclear and other mass destructive weapons on seabeds and underground.

### Moscow City Soviet Bans Nuclear Reactors

914E0068A Moscow IZVESTIYA (Union Edition)  
in Russian 14 Mar 91 p 8

[Article by Andrey Illesh: "Details for IZVESTIYA—the Nuclear Safety of Moscow Today and Tomorrow"]

[Text] One more step on the road to glasnost concerning problems of radiation safety cannot fail to make one happy. Our newspaper was the first to raise the question of nuclear reactors situated in the capital more than a year ago. The reaction of interested departments at that time was businesslike. The USSR Gospromatomnadzor [State Committee for Safety in Industry and the Atomic Power Industry] established a special commission which for the first time conducted a comprehensive verification of all Moscow research nuclear reactors. IZVESTIYA (No. 287 of last year) reported on the results of the activity of this committee, under the rubric "Rumors and Facts."

And here is a new step. The leadership of Moscow has received an opportunity, as is asserted by R. Nikolskiy, a candidate of physico-mathematical sciences and a Gospromatomnadzor specialist, to examine this problem quite competently and thoroughly.

From a decision of the Moscow Soviet of People's Deputies: ...To consider it inadvisable in Moscow to operate nuclear reactors, which represent a potential threat for residents of the city in the event of unexpected breakdowns.... To consider it impermissible to construct

new nuclear reactors here.... To submit a proposal to the government to approve a decision on stopping the operation of the MP reactor in 1991; on stopping the operation of the IR-8 reactor until it complies with contemporary norms and safety rules; to confirm the date of discontinuing the Gamma reactor in 1993.... To propose to the management of the USSR Ministry of Atomic Energy and Industry to develop and present to the Moscow Soviet in 1991 the technical-economic grounds for removing the MP, IR-8, and Gamma reactors from operation. To approve a proposal by the management of the Institute of Atomic Energy imeni I.V. Kurchatov on stopping the operation of the Argus, Hydra, OR, and F-1 reactors in accordance with the completion of research programs and equipment exhaustion.... To propose to the management of the USSR State Committee for Public Education and the Moscow Engineering Physics Institute to develop and submit to the Moscow Soviet in 1991 the technical and economic grounds for removing the IRT reactor from operation, taking into account the fact that the work of the reactor must be stopped no later than July 1999.... To propose to the management of USSR Ministry of Atomic Energy and Industry and the Scientific Research and Design Institute of Power Engineering.... To establish, beginning in 1991, an average annual level of power of the IR-50 reactor equal to 2.5 kilowatts.

Thus, the fate of nine research nuclear reactors is decided.

The details are recounted by Leonid Matveyev, chairman of the Moscow Soviet committee.

"Our committee bore the following name—committee on problems of removing atomic reactors. That is, it was as if their fate was predetermined. But we followed another and, it seemed to us, more reasonable and productive path—we carefully examined and analyzed the safety of each reactor. We asked the opinions of disinterested experts, even of geologists and medical doctors...."

I myself will note: It is obvious that to shut down at one go all production or research work that is in one way or another associated with radiation, even if someone would want this, is impossible. Therefore, a realistic plan was necessary to withdraw from operation facilities whose safety was not demonstrated. And now it is established and affirmed by city authorities. The Moscow Soviet submitted its decision to the government on the question of a phased closure of the previously mentioned nine reactors. (But they belong to the Atomic Energy Institute imeni Kurchatov, the Scientific Research and Design Institute of Power Engineering, and the Moscow Engineering Physics Institute.)

From the "special opinion" of the Institute imeni Kurchatov: "...one could add: The French health resort of Grenoble, a city with a population of 300,000, has five research reactors functioning in its territory with a power of 57 milliwatts, 35 milliwatts, 8 milliwatts, and two with

100 kilowatts, and no one is planning to take them out of operation ahead of time. ...we think it is necessary to agree with the proposal made by us on the dates of cessation of operations of reactor MP—1996, and reactor IR-8—1999."

But today, as a fundamental decision has been made, I would like to talk about something else. About the so-called "fuel assemblies" whose fate has not been considered anywhere. For authenticity I will turn to information provided by the Atomic Energy Institute editorial office.

Aside from specialists, few people know that the conditions for supporting a chain reaction are maintained if its intensity is reduced a billion times and thereby the generation of energy, radiation, and the accrual of fission products is brought to practically zero.... The existence of so-called critical assemblies is based on this physical property of a controlled chain reaction (formerly called "zero power reactors")—arrangements where the insignificant level of power makes it possible to do without a system for removing heat, multi-barrier protection, and other compulsory elements of a nuclear reactor. Such critical assemblies are used for a wide range of tasks, from basic physical research to controlling the quality of the manufacture of the active areas of power reactors.

Indeed, for specialists the merits of critical assemblies are exceptional in many ways. Unfortunately, the payoff for the unique capabilities of the assemblies is also high: Human error and defects in design could lead to the uncontrolled development of a chain reaction.

Such uncontrolled "outbreaks" of power (or "supercritical reaction") have occurred dozens of times in assemblies of the world. The laws of their course are also well known to physicists—acceleration in the intensification of power, release of energy, and automatic extinguishing of the chain reaction owing to the internal property of the assembly.

But the post-Chernobyl nuclear allergy compels us to examine closely even installations such as this that are allegedly safe for the population.

The fundamental difference between accidents at assemblies and reactor incidents, specialists think, is that the largest "outbreak" at an assembly cannot contaminate the environment with fission products. Why? For the very brief time of an outbreak, they simply do not succeed in accumulating in the core. Neutron and gamma radiation is easily weakened to safe limits by the walls of the cubicle in which the assembly is located. However, if during an outbreak a person is inside the cubicle next to the core, a grave outcome is inevitable.

In the Atomic Energy Institute (by the way, open for discussion with the public on the most critical questions), up to 20 critical assemblies were functioning at different times. During these years, incidents also occurred that were dangerous for the personnel. The most serious accident occurred in 1971. (No one has ever even hinted at it to this day in the press.) An uncontrolled divergent reaction occurred then at the end of a shift during the completion of work. Its cause was a hidden defect in design. Four persons who were next to the core received large doses of radiation. Two of them died soon after the accident. The other two incurred serious radiation sickness. People who were at the control panel several meters from the assembly—behind a concrete barrier—did not suffer. The level of radiation background near the building, where the assembly was located, and also the concentration of radioactive aerosols on the territory of the institute remained within safe bounds, much lower than the established norm. There was an absence of any kind of change in the radiation background beyond the boundaries of the institute area. And today's background condition around the Atomic Energy Institute is checked and published regularly. I will note: on the initiative of the Kurchatov employees themselves.

...Over the last 20 years it has been possible to render the critical assemblies much safer through physicist instruments. Rapid progress has made it possible to replace many experiments with machine calculations. Nonetheless, what is the potential danger of such assemblies? It exists only for personnel who deliberately take risks that any experimenter takes—this is the physicists' answer. Moreover, they are convinced that the physical nature of these devices is such that under any emergency they cannot be even a somewhat appreciable source of dispersal of radioactive materials in the environment.

## FRANCE

### Faulty Valves Found at Seven Power Plants

91WP0073A Paris LE MONDE in French  
6 Mar 91 p 26

[Text] Inspections conducted last week during the shut-down of a reactor at the Gravelines Nuclear Power Plant (Nord) by EDF [French Electric (Power) Company] engineers revealed an abnormal blockage of two auxiliary circuit valves. According to the thermal production department, the RPI circuit in question extracts calories carried by the reactor's cooling circuit when the latter is shut down.

According to Pierre Carlier, head of thermal production, the incident did not affect the facility's safety, but it did prompt the EDF to conduct inspections of its entire system of plants. The result: Some 30 of the 1,400 valves in French reactors were found to be blocked in nuclear plants in Cattenom, Blayais, Tricastin, Penly, Paluel, and Saint-Alban.

The valves, which have since been cleared, are not all found in the same circuit. Some are in air flow circuits, for example, and the problem is therefore not a "generic flaw." However, the appearance of the problem at several sites, revealed by preventive maintenance operations, did lead the EDF and the Central Department of Nuclear Power Plant Safety (SCSIN) to classify them as a "2" in terms of seriousness. They could be downgraded to a "1" following a thorough study.

### Saint-Aubin Disposal Site Declared Safe

91WP0073B Paris LE MONDE in French  
8 Mar 91 p 12

[Text] On Wednesday, 6 March, the Atomic Energy Commission (AEC) published the results of a survey conducted over a four-month period by ten research teams (five from the AEC and five from the CNRS [National Center for Scientific Research]) on the Saint-Aubin "disposal site" (Essonne), where ecology organizations had detected abnormal radioactivity (LE MONDE, 25 October 1990). According to the AEC, measurements and analyses confirm "the total absence of any risk to workers, members of the public visiting the site for whatever reason, or surrounding communities."

The extensive investigation, which cost some 500,000 francs, mobilized the most modern technical means. A total of 20,000 points on the seven-hectare terrain included in the AEC Saclay center were surveyed by radiometry. Teams worked independently taking samplings based on specifications defined by scientists. Surface samples were taken from 17 points of the most active zones, completed by five core samplings at a depth of one meter.

The measurements confirmed that radioactivity at the site is due to the spreading, from 1965 to 1976, of mud from the treatment of industrial, sanitary, and chemical

waters from the AEC center at Saclay. "On the basis of measurements from underground and surface areas concerned, it can be estimated that the amount of mud spread is a maximum 2,000 tons of predried materials," the AEC and CNRS/IN2P3 (National Institute of Nuclear and Particle Physics) claim in a joint bulletin.

According to analyses, the 2,000 tons of mud contain .22 gram of plutonium, .9 mg of cesium 137, 20 billionths of cobalt 60, and even smaller traces of a large number of other radioactive elements, including radium 226 (at a single point), strontium 90 (discovered in three samplings from the most active point of the terrain), europium, and thorium. The measure of aerosols shows no release of radioactivity into the atmosphere.

"Natural radioactivity in the Paris region exposes its inhabitants to the equivalent of 1.5 millisieverts (mSv) a year. According to calculations of the National Institute for Nuclear Protection and Safety (IPSN), a person living at the Saint-Aubin site 24 hours a day would receive an additional dose equivalent to .6 mSv/year. The sum of these two figures corresponds to an average equivalent dose in France of 2 mSv/year," experts conclude. Results of the survey will be forwarded to the prefect of Essonne "in the form of detailed reports."

### Industrial Particle Accelerator Developed

91AN0106X Paris SCIENCES & AVENIR in French  
Nov 90 p 11

[Text] Designed by Prof. Jacques Pottier and developed by a team from the Electronics and Instrumentation Department of the Atomic Energy Commission (CEA), the Rhodotron prototype is the first European particle accelerator for industrial use.

It operates on a classic principle: An alternating electrical field serves to accelerate the electrons while large magnets deflect their paths. Injected into a coaxial cavity with a radial electrical field, the electrons accelerate. When they reach the boundary of the accelerator cavity, the effects of a magnetic field oblige them to make a U-turn. Reinjecting into the cavity, they reach a higher speed level, and so on. The process is repeated exactly five times. The recirculation principle makes electrons follow rhodon-shaped, or, for non-Hellenists, rose-shaped paths. The particle beam originating from the accelerator reaches about 3.3 MeV of energy or enough to ionize foodstuffs, for instance.

The Rhodotron meets, in so far as it is possible, the requirements of industry: It takes up a mere eight square meters of surface area; with certain modifications, it could be turned into a simple push button apparatus; and its recirculation principle makes it economical to use. Its promoters are considering selling it for 6.5

million French francs. Although industry seems increasingly convinced of the efficiency of the ionization process, especially in polymerization of plastic and sterilization of medical and surgical equipment, consumers seem somewhat reluctant to consume "ionization preserved" food.

## GERMANY

### German Electron Ring HERA Described

91MI0106X Hamburg DESY JOURNAL in English  
No 3/90, 1990 pp 3-27

[Article by Volker Soergel (Chairman of DESY's Board of Directors) Introductory paper: "On the Completion of HERA"; Peter Schmueser: "The Proton-Electron Storage Ring Facility HERA"; Rolf Windels: "The Buildings for HERA"]

[Excerpts] On November 8, 1990 we celebrate at DESY [Foundation of the German Electron Synchrotron] the completion of HERA [Hadron-Electron Ring Accelerator] after a construction time of six and a half years. This edition of the "DESY Journal" is published on this occasion and is devoted exclusively to HERA.

With HERA, the first proton-electron storage ring facility, it will be possible to investigate lepton-nucleon reactions—up to now a domain of fixed target experiments—with colliding beams. The increase in centre-of-mass energy is so large the new scientific grounds will be broken. Interesting new results can be expected concerning the structure of the nucleon and its constituents, the properties of the weak interaction, and the specific features of the strong interaction. But also questions going beyond the established theories will be attacked. The richness of the scientific programme and the unique features of HERA promise interesting years for DESY and all physicists from outside working on the HERA experiments.

The design and construction of the HERA facilities were a great challenge for all people involved. Two storage rings of completely different characteristics have been built, one for electrons, the other one for protons. In designing the components it was often necessary to apply new concepts for technical reasons and to minimize the costs. Examples are the magnet modules, the copper vacuum chambers and the superconducting cavities for the electrons, new magnet power supplies with maximum current stability or the control system. The greatest challenge however, was the design and construction of the superconducting magnets for the proton storage ring including the large and powerful cryogenic system. Here the willingness of the companies involved to venture into new technical territory was essential for the joint effort.

The extensive construction work should also be mentioned. First the 6336 m long tunnel and then the four

underground experiment halls—an interesting problem for the planning engineers and the contractors which was solved excellently.

First of all, we want to thank the DESY staff for their efforts in completing HERA on time. With great enthusiasm physicists, engineers, technicians, members of the workshops and of the administration have accomplished this task which was almost too ambitious for DESY. Everybody has made his own contribution to ensure that in the coming years research in particle physics at DESY will again be at the forefront.

HERA has been built in international collaboration. Laboratories and research organizations in several countries have developed important components in collaboration with DESY, have had them manufactured by their home industry as their contribution to the HERA project. The most outstanding was the provision of 220 superconducting dipole magnets from Italy. Other countries have sent skilled staff to DESY to join in the HERA construction. They integrated themselves extremely well in the HERA team, and without their help the construction of HERA would not have been possible.

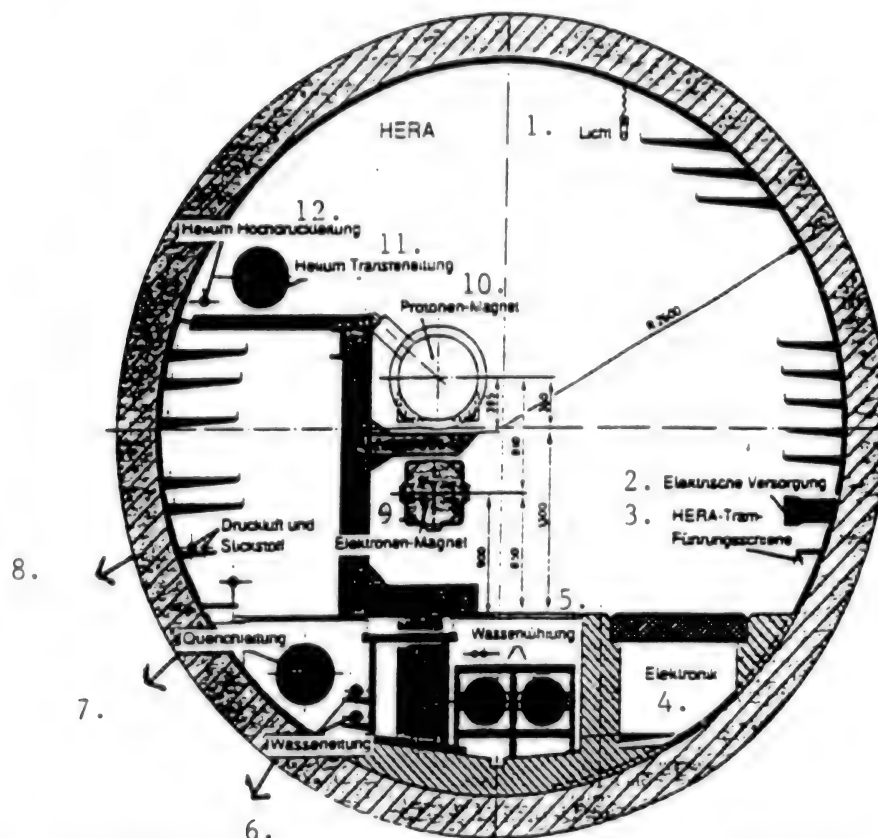
By approving the HERA project and providing the financial resources, the Federal Minister of Science and Technology and the Senat of the Freie und Hansestadt Hamburg have enabled DESY to build a unique research tool. They have also shown their confidence in our ability to master this task. We are also grateful on behalf of the many scientists who now have the possibility to investigate even smaller dimensions of the microcosm at HERA. It is planned to start the research programme at HERA next year with the H1 and ZEUS experiments in which more than 600 physicians from 16 countries are involved. The scientific results are eagerly awaited.

### The Proton-Electron Storage Ring Facility HERA

[Passage omitted] A first section of the proton ring was cooled down this summer and was successfully tested with a positron beam. A lot of valuable information was gained in the test which will be used in the commissioning of the whole ring.

HERA is the first storage ring facility ever built in which the most important building blocks of matter—protons and electrons—interact with each other in a head-on collision. The structure of the proton and constituents can be explored with far better resolution than is accessible with conventional accelerators. The two particle beams are guided in separate magnetic rings and collide only in the experimental areas. HERA is thus more complicated than electron-positron colliders like DORIS in Hamburg and LEP at CERN in Geneva or proton-antiproton storage rings like CERN SPS and the Fermilab Tevatron, since in these accelerators the two particle beams circulate in the same magnetic ring. This is not possible for particles of different mass, and, moreover the maximum proton and electron energies in HERA are very different.





One of the arcs of the HERA tunnel where the particles are bent by magnets. The proton ring is mounted on top of the electronic ring

Key: 1. Light—2. Power Supply—3. HERA Safety Rail —4. Electronics—5. Water cooling—6. Water pipes—7. Quench conductivity—8. Pressurized air and nitrogen—9. Electron magnet—10. Proton magnet—11. Helium transfer guide—12. Helium high pressure guide

#### The Influence of Synchrotron Radiation.

The proton energy is only limited by the available magnetic guide fields. Using superconducting magnets the protons can be accelerated to more than 800 GeV (corresponding to a traversed voltage of 800 000 000 000 Volts). The maximum energy of the electrons is much lower and amounts to 30 GeV nominally. Electrons are difficult to accelerate to high energies as they steadily lose energy by synchrotron radiation when passing through bending magnets. The energy losses of the total beam are enormous. To store the electron beam in HERA at 30 GeV, the radio-frequency system of the accelerating cavities has to provide a power of 13 MW (13 megawatts). The power requirements increase with the fourth power of the electron energy so it is impossible to go far beyond 30 GeV. Even increasing the ring would not gain a large factor: in the LEP storage ring with a circumference of 27 km the top electron energy is presently 50 GeV (a second stage is planned with 100 GeV and large RF power). The synchrotron radiation of the protons is many orders of magnitude lower and can be neglected in HERA.

Besides strongly limiting the electron energy the synchrotron radiation and the operation of the HERA collider and of the experiments H1 and ZEUS. To provide head-on collisions without crossing angle, bending magnets are needed before and after the experiments which steer the beams against each other. The synchrotron radiation generated in these magnets has such a high power that it would boil away the liquid helium in superconducting magnets. For this reason, the straight sections are equipped with normal magnets. To reduce the synchrotron radiation background in the detectors to a tolerable level, collimators and careful shielding are needed.

Finally, since the synchrotron radiation extends into the hard X-ray region, it constitutes a significant radiation level in the tunnel. The vacuum chambers of the electron ring are made from 4 mm thick copper and are surrounded by lead to absorb 98 percent of the radiation. Nevertheless, all cables must be equipped with radiation-resistant insulation and semiconductor electronics has to be installed in shielded concrete caves.

From all this it becomes apparent that the synchrotron radiation of the electrons has severe impacts on the HERA storage ring and the experiments. The difficulties are due to the very small value of the electron mass and arise in a similar manner also in the large electron-positron colliders like Tristram at KER near Tokyo and LEP. However, there is also a positive effect: the stored electron beam is in general much less sensitive to perturbations than the proton beam. Since the electrons are steadily losing energy by emitting photons their loss has to be compensated in the accelerating cavities to keep the energy of the beam at a constant value. The combination of radiation and re-acceleration leads to a damping of the transverse and longitudinal oscillations of the particles, i.e. the amplitudes of these oscillations shrink with time. The electron bunches become narrower and shorter until they reach their minimum dimensions (For experts: this is given by the balance between the damping and the excitation of oscillations caused by quantum fluctuations.) Loosely speaking, this effect is called "radiation damping". It has the additional benefit that oscillations of the electron beam as a whole which have been excited by perturbations in the magnet power supply or other devices are damped out quickly.

The proton beam has no radiation damping. The particle bunches are much longer and wider than for the electrons. In addition, the protons "remember" every perturbation. Any oscillation or inadequate regulation of the magnet power supplies is immediately transmitted to the protons and excites oscillations which do not vanish again. If more and more perturbations come in, the beam blows up and may lose much of its intensity. The requirements on the power supplies and the RF system concerning ripple and noise are therefore much more demanding than for electron accelerators. The experience at CERN and Fermilab has shown, however, that with sufficient care proton beams can be safely stored for 20 hours or more.

### The HERA Electron Storage Ring

For the HERA electron storage ring many features could be taken over from the former electron-positron collider PETRA, which is now used as a pre-accelerator for HERA, but there are a number of remarkable novelties. The ring is composed of preassembled modules, each containing a nine meter long dipole, a quadrupole and a sextupole. The installation and alignment in the tunnel was greatly simplified. The coil of the dipoles consists of a single aluminium conductor of large cross section which is insulated by a prefabricated glass-fibre-epoxy box. This design, being very cost-effective, has the big advantage that the insulation is insensitive to radiation load. Considering the damage in the PETRA magnets which requires re-insulation of all coils, this is a big improvement. A new technical development is also the use of copper vacuum chambers mentioned above.

The electron ring is equipped with 82 normal-conducting 500 MHz cavities which were taken over from PETRA.

To reach the design energy of 30 GeV additional superconducting cavities are needed (see Box 1). These have been produced by industry and are presently being tested. The first commissioning of the electron ring took place in August 1988 and was immediately successful. In the summer of 1989 the beam was accelerated to 27 GeV and stored for many hours. To reach the design electron currents in PETRA and HERA feedback systems are needed (see Box 2).

### The HERA Proton Storage Ring

When HERA was planned no large superconducting accelerator existed and the magnets for the Tevatron, then under construction at Fermilab, suffered from a variety of problems. Meanwhile, the Tevatron has been upgraded to a proton-antiproton collider featuring excellent luminosity at the highest energy presently available. The pioneering spirit of our American friends has paid off. Part of this spirit can also be found in the HERA project with its large scale application of superconductivity in the magnets of the proton ring and in the cavities of the electron ring as well as in the scientifically and technically demanding goal to collide particles so different, as electrons and protons.

In the superconducting magnet prototype program we have tried to profit as much as possible from the experience of the Americans to avoid unnecessary delays or wild goose chases. The first 6 m long dipoles were basically copies of the Tevatron magnets. Their good performance was the precondition for the approval of the HERA project. On April 6, 1984 the Federal Minister of Research and Technology Dr. Heinz Riesenhuber and the then Hamburg Senator for Science and Research Prof. Hansjorg Sinn signed the document of approval in front of one of these magnets.

In January of the same year a significant change of the magnet concept was proposed allowing reduction of the coil current by 600 A and improving the operational safety of the HERA accelerator. It was suggested mounting the iron yoke not outside the cryostat as before but have it directly surround the collared coil and installed inside the liquid helium container. The advantages of the new concept, first derived from calculations and shortly afterwards from 1 m long model magnets, turned out to be so convincing that it was decided to equip HERA with the new type of magnet in spite of an unavoidable time delay. At the same time the length of the dipoles was increased from 6 m to 9 m thereby reducing the number of dipoles from 624 to 416 with corresponding savings in the costly cryostat ends.

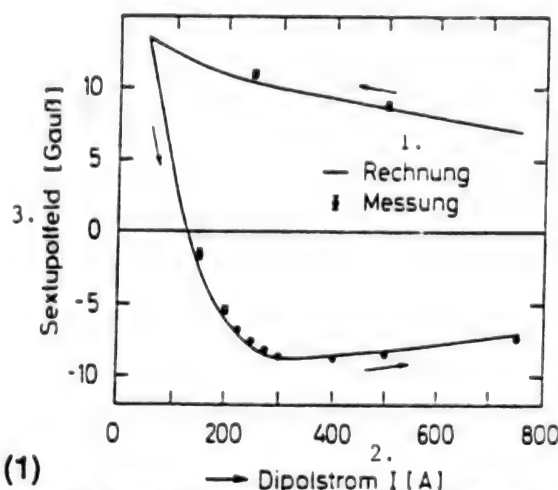
With the HERA project for the first time large series of superconducting magnets have been produced in various industrial firms (see Box 3). The magnets have met all expectations concerning field quality and electrical safety. The rejection rate was only about 1 percent, far below the expected level. The approved or proposed projects Superconducting Super Collider SSC in Texas, USA, Large Hadron Collider LHC at CERN and UNK in the Soviet Union will all use magnets of the "HERA type."

Superconducting magnets generate significantly higher field than normal magnets and do this at much reduced operational costs. The HERA dipoles have a nominal field of 4.7 T (Tesla), far beyond the saturation magnetization of iron. Some 6MW are needed in the helium refrigerator to cool the HERA ring with a stored beam at 800 GeV compared to the 52 MW required to power the normal magnets of the CERN SPS at a proton energy of only 315 GeV.

Superconducting magnets have a number of properties which are not found in normal magnets and require careful attention. It is no longer possible to determine the field pattern with accurately shaped iron pole shoes but the coils must be fabricated with extreme precision in order to keep the field errors within the tolerable limits of about 0.01 percent. The conductors in the coil have to be positioned with an accuracy of typically 0.02 mm. This precision must be maintained in the presence of huge magnetic forces: at 5 T, the two halves of a HERA dipole coil repel each other with a force of one million Newton per meter length (this corresponds to the weight of a heavy truck). Very strong clamps ("collars"), surrounding the coil, take up this force and guarantee the mechanical precision. The experiences at Fermilab and DESY have shown that this concept works well and yields magnets with excellent field quality up to their highest field.

An unpleasant property of a superconductor is the "quench", the sudden and undesired transition to the normal state. If that happens the high current in the coil must be reduced to zero in less than a second to avoid overheating and destruction of the coil. Quench recognition and protection are among the most important tasks at a superconducting accelerator. At DESY a lot of research and development has gone into this area. Quenches may be triggered by local overheating of the cable beyond its critical temperature, for example when the conductors move slightly during the excitation of the magnet. By choosing a high precompression of the coil these quench origins can be largely eliminated. The HERA magnets have all passed the nominal field of 4.7 T and most of them could even be excited to the critical current of the superconductor (corresponding to more than 6 T) without a premature quench. In spite of this ample safety margin quenches might still occur if a large fraction of the proton beam hits the coils or if the helium cooling breaks down. An elaborate safety system is therefore indispensable.

The advantage of superconducting coils turns into a drawback at low excitation. The eddy currents, which are induced in any coil when the field is changed, do not decay exponentially but continue to flow forever. These bipolar "persistent" currents generate field distortions which are far beyond the tolerable level at the low proton injection energy of 40 GeV and require an elaborate system of superconducting correction coils. The field distortions exhibit a pronounced hysteresis (see Fig. 1) and in addition a small time drift (Fig. 2) which also has to be corrected for. The control and programming of a



(1) — Dipolstrom I [A]  
Figure 1. The sextupole field in a superconducting dipole magnet for increasing and decreasing current. The lower curve is used for the injection of the protons at 246 A.

Key: 1. Calculation Measurement—2. Dipole Flow I [A]—3. Sextupole Field [Gauss]

superconducting accelerator is evidently more complicated than that of a normal one but presents no basic difficulties as proven by the successful operation of the Tevatron. To facilitate the control of HERA we have carefully measured and calculated the persistent current effects in all magnets will be installed in which the field distortions can be measured during the injection and acceleration phase of the proton beam.

#### Installation of the Proton Ring and Test of the First Octant

The installation of the superconducting magnets in the tunnel started about a year ago and was finished in October this year. The installation comprises many carefully scheduled tasks: transportation and mounting of the magnets; alignment; connection of beam pipes and leak search; soldering of the superconducting cables for the main current and the correction coil currents; check of the electric connections; welding of the tubes for liquid, two-phase and gaseous helium; mounting of radiation shields and superinsulation; connection of cryostat vacua; pumping and leak search. Most of the superconducting correction coils are mounted on the beam pipes inside the dipole or quadrupole magnets. Since their field cannot be measured from the outside much effort has gone into checking the electrical connections. The circuit diagrams were generated by computer and a computer-controlled measuring system was used to ensure that the correction coils are all connected to their appropriate current supply and have the correct polarity. There are over 1000 of them, so this was not a trivial task.

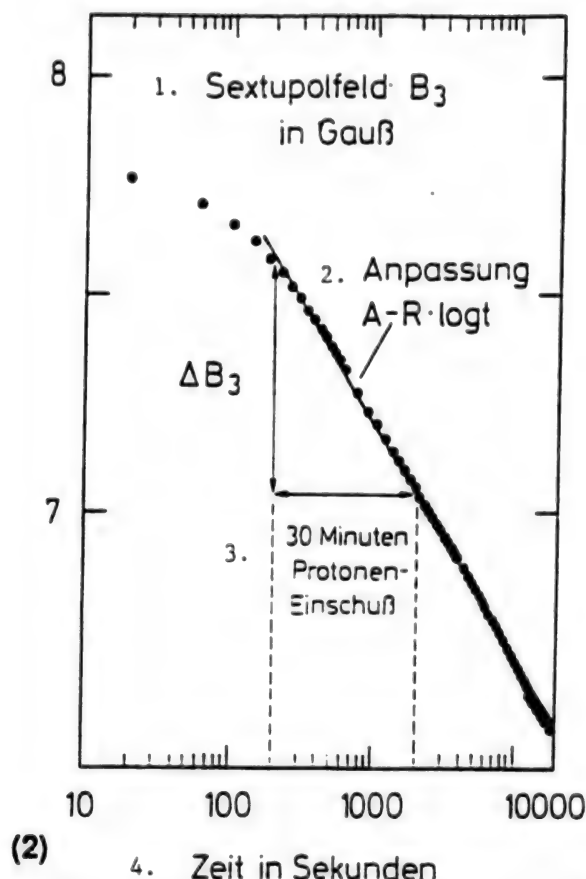


Figure 2. The change of the sextupole field of a dipole magnet during the 30 minute proton injection period.

Key: 1. Sextupole field  $B^3$  in Gauss—2. Approximation to A-R logarithm—3. 30 minute proton injection—4. Time in seconds

The first section of the HERA-ring, the octant "West Left" extending from Hall West towards the centre of the arc in south direction and comprising 52 superconducting dipoles and 26 quadrupoles was cooled to its operating temperature of 4.5 K (4.5 Kelvin = -268.7°C) in March 1990. Gaseous helium was pumped through the magnets whose temperature was gradually lowered from 293 K (room temperature) to 80 K (liquid nitrogen temperature). The cooling power was purposely reduced to avoid temperature gradients of more than 50 degrees in any magnet. (With full cooling power one could achieve temperature differences of more than 200 degrees between beginning and end of a magnet. The resulting mechanical stresses would be excessive and could lead to permanent deformations and other damage). Fig. 3 shows the time variation of the temperature in several magnets of the octant. The 80 K level was reached after 90 hours. The cooldown was continued with colder gas and finally with liquid helium. It took only 30 more hours to reach 4.5 K since the heat

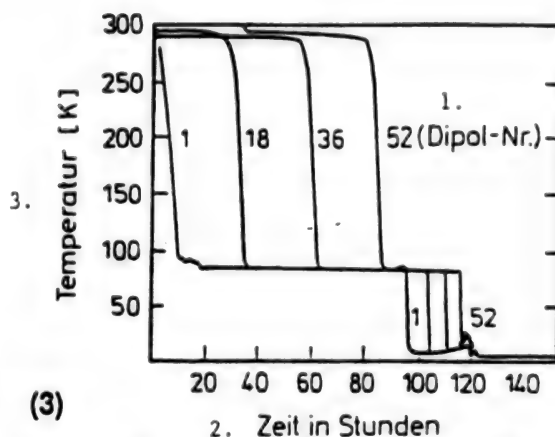


Figure 3. The cooling procedure of the first HERA octant consisting of 52 superconducting dipoles and 26 superconducting quadrupoles. The diagram shows the temperature profile in four dipoles.

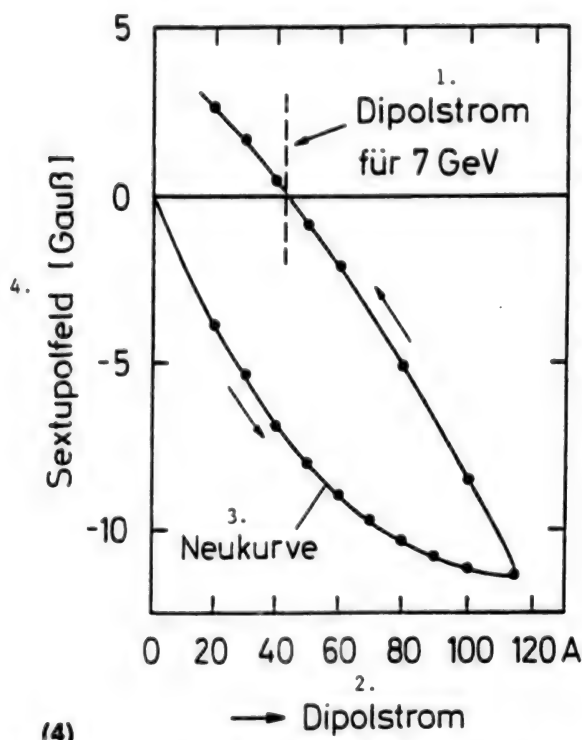
Key: 1. Dipole Number—2. Time in hours—3. Temperature

capacities of coil and yoke become very small at low temperatures. In the cold octant the amount of energy which flows via heat conduction and radiation into the liquid helium container and to the radiation shield was measured. The measured values conform with the expectations, so only two of the three cryogenic plants are needed to cool the whole HERA ring.

In the next step the quench protection system was checked. By means of the built-in electric heaters the magnets were quenched one by one at an operating current of 1000 A. It was verified that the quench detection system worked properly in every single case and caused the coil current to be switched off. Initially, there were some false alarms from cross talk but it was possible to eliminate them by adjusting the detection thresholds. The second important goal of the octant test has thus been accomplished: to check and verify the reliability of the quench protection system.

During the end of June and beginning of July a particle beam was passed through the octant. Since protons of 40 GeV were not available the experiment was carried out with positrons of only 7 GeV. The field distortions from persistent currents are normally hundredfold larger than tolerable at this extremely low energy and compensation with the correction coils appeared difficult. For this reason the magnets were subjected to a special initialization procedure which following theoretical considerations—had been first tried out on two magnets: The whole octant was warmed up to 20 K to make all magnets normal conducting and extinguish any persistent currents left over from the previous current cycles. The coil current was raised to 112 A and then reduced to 42.5 A, the value needed for the 7 GeV positron injection. Fig. 4 shows that the sextupole field rises to 13





**Figure 4.** The diagram shows a special running-in procedure of the superconducting proton magnets during the first octant test, before 7 GeV positrons were injected into this 700 m long section. The disturbing sextupole field vanished if the upper curve is used

Key: 1. Dipole flow for 7 GeV—2. Dipole Flow—3. New Curve—4. Sextupole field [Gauss]

Gauss at 112 A but decreases when the current is ramped down and crosses zero just at 42.5 A. (For experts: the previous warm up ensures that no magnet flux remains trapped in the superconductor. The superconductor is then first in the Meissner phase and, with increasing coil current, enters partly the mixed phase. By a proper choice of the maximum current (here 112 A) the hysteresis curve can be matched to the requirements as shown in Fig. 4. A corresponding adjustment would however, not be useful for the proton injection at 40 GeV: in the subsequent acceleration phase the field distortions would rise rapidly and become as large as shown in Fig. 1.)

It took only 15 minutes to steer the positron beam through the octant although only two monitor screens were available at this moment. The 26 positron monitors were successfully operated a few days later. The optics of the octant was checked by means of oscillations of the whole beam excited by correction dipoles as well as the correct functioning and polarity of the correction quadrupole and sextupole circuits. So the positron test of the first HERA octant has been very successful and gives a lot of encouragement for the commissioning of HERA. It is planned also to check the whole ring initially with

positrons since particle pulses are available every second which is very helpful in adjusting the electronics of the position monitors. Finally, the magnet current was raised in steps to the nominal value of 5000 A. Even 6000 A were achieved for a while without quenching a magnet. This demonstrated that a whole octant can be operated at the nominal current and well beyond.

#### The Pre-Accelerators for HERA

Like all large accelerators, the HERA rings also need a whole chain of pre-accelerators, which are all operated from the main control room. This is well known at DESY for the electrons. For the protons one starts with negatively charged hydrogen ions, i.e. proton with two attached electrons. Their production in an 18 keV ion source and the two first pre-accelerator steps (radio frequency quadrupole and linear accelerator) are described in Box 5.

The advantage of H-ions is that they can be easily injected into DESY III. Inside the injection magnet there is a very thin foil (200  $\mu$ m) which strips off the electrons and transforms the negatively charged ions to positively charged protons. By means of this trick it is possible to add more particles to the already circulating proton bunches in DESY III. (For experts: the Liouville theorem is thereby circumvented and one can increase the particle density in phase space.) PETRA has to accelerate the protons from 7.5 to 40 GeV but the studies have not yet been finished.

#### Outlook to the Near Future

The north half ring was cooled down in October, the south half ring will follow in December. The first circulating beam is expected in the spring of 1991. For the proper operation of the proton ring a number of control and steering programs still have to be written and the reference magnets have to be commissioned. Considering the large progress made 1990 these tasks can be attacked with confidence and determination. The first proton-electron collisions in HERA are expected in summer 1991.

#### The Buildings for HERA

When the DESY physicists presented their ideas on the construction of the HERA storage ring and looked for a possible site the unanimous response of the civil engineers was that there was no chance to build such an enormous tunnel with a circumference more than 6 km, in Hamburg, and even less so close to the DESY site.

Nevertheless, it worked out well. After much searching and with a lot of luck three suitable sites for the experimental halls were found outside the DESY site. Application was submitted for the rights to tunnel under land which did not belong to DESY and the Hamburg planning office quickly approved it.

The tunnel runs with a radius of about 2 km in an almost circular path under the neighbouring Altona Volkspark. To the west and south it lies under industrial and urban

land, but otherwise under parkland and open country. The depth of the tunnel is matched to the landscape. It lies in an inclined plane which has its highest point in the south and slopes down to the north at 1 percent. This means that the largest height difference is 20 m. The axis of the tunnel is at a depth of up to 30 m.

The subsoil consists largely of layers of sand whose uniformity is disturbed at isolated points by glacial marl. This subsoil was laid down in the last ice age and is therefore scattered with boulders of various sizes. In the south the tunnel is above the water table, but in the north lies up to 15 m below it.

The experimental halls are up to 27 m deep and are constructed of reinforced concrete. A hall has a floor area of 43 m by 25 m and is 15 m high. Only small access buildings are visible at the surface and heavy components are lowered by crane.

The tunnel was built according to mining techniques by means of a hydraulically driven shield. This type of machine is particularly suitable for the light subsoils of northern Germany. The walls are lined with reinforced concrete segments 30 cm thick, and the tunnel has an inner diameter of 5.2 m.

Construction was commenced in May 1984, immediately after approval by the Federal minister of Research and Technology and the Senator of Science and Research of the Freie und Hansestadt Hamburg was received. One year later tunnelling began from the first experimental hall and the circle was completed in August 1987. The basic construction was completed in January 1988.

The constructional costs stayed just below DM 230 million excluding value added tax, and were exactly within the estimate. Civil Engineering, Structural Design, Specification, and Construction Supervision: Dr. -Ing. Rolf Windels, Dr. -Ing. Guenter Timm, Dr. -Ing. Karl Morgen, Consulting Engineers VBI.

#### [Box insert 1, p 8]

#### **Dieter Proch: "Superconducting Cavities for the Electron Ring"**

The acceleration units of the HERA electron ring are cavity resonators with an eigenfrequency of 500 MHz (500 000 000 oscillations per second). At present the ring is equipped with 82 normal conducting cavities which provide a circumferential voltage of 145 MV (145 000 000 Volts). In addition, 16 superconducting cavities will be installed raising the voltage to 241 MV.

The field strength of a copper cavity is limited to about 1 MV/m because of the heating of the metal. Superconducting niobium cavities have been developed at DESY for HERA and at CERN for LEP. They allow field strengths up to 8 MV/m and are limited by field emission effects. The maximum power which can be transferred to the beam is at present 100 kW per resonator.

In contrast to the loss-free flow of a direct current in superconducting magnets the high frequency currents in cavities lead to losses due to eddy currents even in ideal superconductors. The generated heat has to be extracted by liquid helium. A total electric power of 400 kW is needed in the helium refrigerator to provide the cooling for 16 resonators. This, however, is only 10 percent of the power consumption of normal cavities with equal performance.

The electrons in the storage ring are concentrated in 210 bunches of 2 cm length each. The circulating beam current contains a dc part and high frequency components. When the electron bunches pass through the cavities they are not only accelerated but also can excite oscillations in the cavities. These "higher mode" oscillations lead to losses and have a negative influence on the beam. Therefore one of the main tasks was to design an antenna (see photograph) which damps the unwanted oscillations but leaves the accelerating field undisturbed.

In a prototype programme important single components of the resonators and cryostats have been developed at DESY. Based on the experience with these prototypes, 16 resonators and their cryostats have been built in industry. After testing they will shortly be installed in HERA.

#### [Box insert 2, p 10]

#### **Dieter Kohaupt: "Feedback System for PETRA and HERA"**

In electron storage rings the energy lost via the emission of synchrotron radiation is compensated in the acceleration cavities. Unfortunately, the bunches themselves excite electromagnetic fields (so-called parasitic fields) in the cavities leading to forces between different bunches. These forces increase with increasing beam current. Above a certain threshold the bunch motion becomes unstable and it is impossible to achieve higher intensities.

The way out is the following: By means of a pickup electrode any deviation of a bunch from its "equilibrium orbit" is recorded. From the signal a current pulse is generated which feeds a correction coil. Thereby the original orbit is restored. Such a feedback system requires a considerable technical effort and has been successfully tested at PETRA recently.

In principle it functions as follows: A pickup electrode generates a signal which is proportional to the (generally very small) deviation of a bunch from the design orbit. The signals are very weak and a high gain is needed in a low noise amplifier. This detector amplifier as well as the associated digital and analog electronics have to be very fast to be able to distinguish between adjacent bunches which are only 96 ns (0.000 000 096 seconds) apart in PETRA and HERA. The amplified signal is digitized and filtered. The correction signal is derived by digital methods and then converted back to an analog signal.

This signal steers a fast power amplifier which sends a current pulse to a correction coil correcting the orbit deviation.

The requirements concerning speed and precision of the system are very demanding for the physicists, engineers and technicians involved in the design and construction. For example, the signals have to be transferred with an accuracy of better than 2 ns.

Since the particle bunches can become unstable in the horizontal, vertical and longitudinal (beam) direction, feedback systems for all three directions have to be installed. This has already been accomplished for PETRA and the systems have been successfully tested. It was possible to raise the beam current from 2.5 mA to 45 mA. For the HERA ring these systems are under construction.

[Box insert 3, p 12]

#### **The Realization of the HERA Project—An International Undertaking**

The proton-electron collider HERA was realized in international collaboration with contributions from laboratories and research centers from six countries. These contributions came in the form of components for the HERA storage rings and injection systems, developed and constructed by the participating institutes in co-operation with local industry. In addition, skilled staff from five countries were sent to DESY for one to three years to join in the HERA construction during the whole six and a half years. This shows the great interest of the science community in HERA.

The contributions in detail are:

CEN [Nuclear Engineering Research Center], Saclay, France

Design of the superconducting quadrupole magnets for the proton ring, development of the production tooling and construction of prototypes in collaboration with DESY, technical responsibility for the whole series production of 246 quadrupole and as a French contribution provision of 126 quadrupoles produced by French industry.

Weismann Institute of Science, Rehovot, Israel

Design, construction and test of the main current leads which connect the 4.5 K coil and the room temperature current leads for the superconducting magnets.

INFN [National Institute of Nuclear Physics], Rome, Italy

Delivery of 232 superconducting nine metre long dipole magnets, manufactured completely by Italian Industry - this amounts to half of the total number of superconducting dipoles needed for the proton storage ring.

TRIUMF Laboratory, Vancouver, Canada

Design and construction of the 80 m long beam transport system to take the 50 MeV negative hydrogen ions from the linear accelerator "LINAC III" to the proton synchrotron "DESY III".

Chalk River Nuclear Laboratory AECL, Chalk River

Design, construction and test of the 52 MHz radio-frequency systems for the proton acceleration in "PETRA II" and for the first bunch compression in HERA

National Institute for High Energy Physics NIKHEF, Amsterdam, Netherlands

Development of superconducting correction elements for the proton machine in co-operation with DESY and Dutch industry, provision of about 450 correction quadrupole and sextupole coils and 250 correction dipoles manufactured by Dutch industry.

Brookhaven National Laboratory BNL, Upton, United States

Quality control of the superconducting cable for the dipole and quadrupole magnet coils and the correction elements.

P.R. China, Poland, CSFR, former GDR, United Kingdom

Physicists, engineers and technicians from five countries were sent to DESY to collaborate in the HERA construction, (their stays in Hamburg was normally between one and three). About 50 people from P.R. China, 40 from Poland, three from Czechoslovakia, three from the former GDR, and three from the United Kingdom worked at DESY at the same time.

[Box insert 4, p 18]

#### **Gerhard Horlitz: "The Refrigeration System for HERA"**

The central refrigeration system of HERA has to cool down all superconducting components of the HERA storage rings and of the two experiments to 4.5K (-268,7°C) and has to maintain the temperature at this level with a circulating proton beam.

The following cooling power is required: 13.6 kW (13 600 watts) at 4.5 Kelvin, 40 kW at 40 K and 42 g liquid helium per second for the cooling of the current leads. This power is subdivided between two identical plants, each supplying one half ring of HERA. The primary electrical power is 2.7 MW per plant. For redundancy a third refrigerator has been added. The liquid helium and the cooling gas is distributed around the ring by two vacuum insulated transfer lines, each 3.5 km long.

The refrigeration is provided by means of a closed helium circuit: room temperature helium gas at a maximum pressure of 18 bar passes through a system of heat exchangers and turbines. Generating mechanical work in the turbines, the helium is cooled down to a temperature

of 5 K at a pressure of 3.5 bar. The operating temperature of 4.5 K is established in the distribution boxes in the tunnel making use of the so-called Joule-Thomson Effect.

Compressors, coldboxes and all auxiliary equipment (gas purifiers etc.) are concentrated in a central cryogenic hall. The 52 dipoles, 26 quadrupoles and the correction coils of one HERA octant are cryogenically connected in series with one common helium flow. In the event of a quench the helium evaporating from the magnets is guided through safety valves into a collecting line which is installed around the whole tunnel and is connected to the storage tanks in order to recover the gas.

The central refrigeration plant has been in operation continuously during the past three years to supply the test benches on which all HERA magnets were extensively tested before their installation in the tunnel. In this period and during the cooldown and test of the first 700 m long HERA octant the refrigeration system and all control circuits worked very reliably.

#### [Box insert 5, p 20]

#### Uwe Timm: "The First Pre-Accelerator Stage for HERA's Protons"

The protons reach the HERA injection energy of 40 GeV in three steps via the pre-accelerators "LINAC III", "DESY III" and "PETRA II". In the first stage they are accelerated together with two electrons attached to them, i.e. as negatively charged hydrogen ions. These are particularly suitable for the injection into DESY III. They are produced in an ion source in which hydrogen gas is decomposed by a hot plasma into atoms, protons and electrons. When cesium is present negative hydrogen ions are formed which are removed from the discharge chamber by a positive voltage of 18 keV (18 000 Volts).

A novel accelerator of only 1.2m length, a radio frequency quadrupole (RFQ), raises the ion energy from 18 to 750 keV. The principle was proposed in 1969 by the Russian scientists Kapchinskij and Teplyakov but this device could only be built in the beginning of the eighties with computer-controlled milling machines which achieve accuracies in the  $\mu\text{m}$  (0.001 mm) range. The device has four electrodes with a sinusoidal modulation along the axis. An electric field of 200 MHz (200 000 000 cycles per second) influences the beam in three ways: the ions are collected into bunches synchronized with the r.f. wave, they are focused towards the axis and they are accelerated to 750 keV. The RFQ is much more compact and less expensive than the previous electrostatic accelerators which needed dc voltages of 1 MV and large buildings.

The 750 keV ions have 4 percent of the speed of light and need further acceleration before they can be injected into the synchrotron DESY III. The linear accelerator "LINAC III" consists of three Alvarez-type resonators of 1 m diameter and with a total length of 34 m. The

acceleration is provided by 131 drift tubes of increasing length to match the increasing velocity of the ions. The energy is transferred to the ions by an electric field oscillating between the tubes which has a power of 5000 kW. The beam passes the three resonators in less than a microsecond and has then gained a kinetic energy of 50 MeV, sufficient for the injection into DESY III.

#### Assistance for Iraqi Scuds Detailed

91GE0163A Hamburg DER SPIEGEL in German  
25 Feb 91 pp 112-115

[Unattributed article: "We Have Power in the Tank"]

[Text] All across the Federal Republic, prosecutors are investigating a good dozen companies alleged to have helped the Iraqis arm their Soviet Scud missiles for the Gulf war. The Americans warned the Federal Government about German involvement early on, but Bonn did nothing.

For two whole days last week, around two dozen customs investigators, intelligence officials, and public prosecutors at the Customs Criminal Institute in Cologne discussed the innards of a missile—the Iraqi version of the Scud-B.

The experts were trying to decipher the mystery of code abbreviations such as "SK," "HU," "AB," "1728," and "144/1" to "144/5." Knowledge concerning combustion chambers, pressure stabilizers, and fuel compositions was exchanged. For many, it was news to hear of work by the former GDR on the projectile, which in the NVA [National People's Army] was known as the "8 K 14 Missile."

Because of the Scud missile, a good dozen German companies are under investigation all across the country—a chain without end. In the middle of last week, investigators in search of Scud-B documentation scoured Lower Saxony's SK-Industriebedarf in Lihenthal, near Bremen. Four further inspections are scheduled for this week. Western intelligence agencies have discovered especially deep German involvement in the Iraqi missile program. However, the investigators are assuming that there is one—as yet unidentified—person calling the shots for all Scud-B activities in the Federal Republic. It seems certain that this man is not one of the business executives targeted thus far.

There are many interconnections in the German Scud sector. With his Inwako GmbH, Friedrich-Simon Heimer of Bonn appears to be the most important buyer in the west and north of the country. He had connections to a supplier in Kiel and to Plath KG in Hamburg. The company is suspected of having supplied Baghdad with gyro compasses for Scud-B reproductions.

Investigators attribute a key role to businessman Gerhard Paul. According to the latest findings, the director of Havert Industrie-Handelsgesellschaft mbH in Neu-Isenburg maintained close relations with the Hamburg



company, Stalco Industrieranlagen GmbH, which for some time has been considered one of Baghdad's most important suppliers. Now, however, many of Stalco's hot connections are destined to remain a mystery. The company's director, an Iraqi named Dhia Aziz Ghanni, was killed on 16 July 1990 at the Vienna Hilton Hotel—by an employee of the Iraqi Ministry of Interior, investigators claim.

The investigators have located another central figure in the southwest: entrepreneur Werner Beaujean, from Stutensee near Karlsruhe, an engineer, who was valued as a business partner in Iraq due to his specialized knowledge in the area of nuclear technology.

Beaujean is alleged to have supplied a development facility for rocket propulsion systems. In his records, investigators found the textbook formula for Scud-B fuel. But Beaujean is out of consideration as the person calling the shots.

The situation is gradually beginning to confuse investigators. For example, on 15 January the Federal Office of Criminal Investigations [BKA] sent a telex to its colleagues in Muenster, Westphalia, dispatching them to a foreign trade firm at Gartenstrasse 12 in that city, "in order to collect information." Two days later, the police reported a nil return: "No office, no firm, no person of that description."

The BKA had made a mistake; the company was headquartered in the small town of Muenster in the Hessian kreis, Darmstadt-Dieburg. But a raid by the Customs Criminal Institute had already taken place there on 13 October.

New names are cropping up continually. In the meantime, even major companies are falling under suspicion. According to the latest findings, for example, Saarlouis AG in Voelklingen is alleged to have produced alloyed sheet steel, steel rings, and bored steel rods for another Iraqi missile project.

The material—40 metric tons of sheet steel and 14 metric tons of steel rings valued at 3.8 million German marks [DM]—was ordered by Export-Union GmbH in Duesseldorf, against which a judicial inquiry is under way. The heavy material has long since been delivered to Iraq, which does not make the investigation any easier.

Initially, investigators were putting their money on a nuclear application. Since then, it appears certain that the parts were tailor-made for the Condor II missile project.

The Cologne construction company Strabag is also finding itself under increasing pressure. The fifth largest construction enterprise in the Federal Republic, which has already been under discussion due to various embargo violations (DER SPIEGEL No. 7, 1991), supplied building machinery and equipment for this missile project.

Moreover, the Iraqis had a not insignificant role in mind for Thyssen Industrie AG. In the meantime, the management there has admitted to supplying Baghdad with 35 turbopumps, intended for installation in the Scud-B.

Looking into German involvement in Iraqi missile projects reveals many parallels to the failings of the Federal Government in conjunction with the poison gas factories in Rabita, Libya and Samarra, Iraq. Foreign intelligence agencies made note of the construction of the monstrous chemical facilities early on in the 1980's, but Bonn did not take the warnings seriously.

According to findings at the meeting of investigators in Cologne, American sources provided advance warning of the Iraqi missile deals as well. And German officials in turn reacted half-heartedly.

The affair began in early 1989. For weeks, American customs investigators had shadowed businessman Samir A. Vincent. The geophysicist is the owner of Phoenix International McLean, in Virginia, and was a representative of Torrington Investment Inc. in Geneva.

The American of Arab descent had splendid connections with Saddam and maintained good contacts with German businessmen who apparently played an important role in Iraqi missile projects. Faxes and telexes between Vincent and German companies were intercepted.

The Americans provided the Federal Intelligence Service (BND) with concrete identification of German partners of the U.S. businessman, including Paul of Havert in Neu-Isenburg, with whom Vincent had concluded a cooperative agreement.

The contract dealt with business relations to the Iraqi Ministry of Defense (MOD) and to the SOTI (State Organization for Technical Industries) in Baghdad, the central purchasing organization of the Iraqi military. In this way, the partners agreed to inform each other of new orders and to involve each other accordingly.

The U.S. scouts recommended that the German missile accomplices be shadowed wherever they went. However, nothing came of this. Because the BND is not responsible for domestic surveillance, the officials in Pullach notified the Federal Government on 25 July 1989. But observation by the Federal Office for the Protection of the Constitution [BfV] or the police was not forthcoming.

It was not until mid-January 1991 that the Hessian company was thoroughly searched. According to information provided by the Ministry for Economics, the company, together with an affiliate, was devoted "exclusively to the Iraqi project for refitting the Scud."

The affair is having wide repercussions; a total of seven other accomplices in the proximity of Havert have had their covers blown. In the Americans' view, even more suspects would have been discovered if officials had stepped in earlier.

Up to now, there has been a great deal of guessing about the Iraqi missile potential. Numerous secrets surrounding the Scud-B have been deciphered through the inquiries.

Because the Soviets refused to supply the more modern SS-12 missiles (900 km range) in the mid-1980's, Iraq decided to rebuild the Scuds. A basic model was shipped to Brazil, where it was broken down into individual parts by arms manufacturer Avibras.

Subsequently, the head of the Iraqi missile program, Amir al-Sa'di, ordered reproduction parts for the Scud program. The engineer, who had studied in the Federal Republic, oversaw the building of a modernized Scud version from new and old parts at the missile center in al-Falluja (Project 124). This involved a great deal of patchwork. The technicians threw together two new Scuds from three old ones. The fuel tanks were disassembled and welded together into larger ones.

In order to extend their range, the Iraqis reduced the size of the warhead considerably, so that the missile could carry a metric ton more fuel. The projectile was renamed al-Husayn, achieved a range of 600 km, and was used for the first time in 1988, in the war with Iran.

Baghdad launched a total of 189 missiles against the mullahs. A modified version—around three meters longer with a range of 900 km—came into being at the end of the 1980's, with German assistance. The al-'Abbas was reported to be filled with supercooled fuel—a system that has long been standard in modern aviation technology.

"We put power in the tank," said an Iraqi officer proudly at an exhibition by the Baghdad Ministry of War in May 1989.

However, the approximately 70 missiles fired at Israel and Saudi Arabia during the Gulf war have apparently reached their targets only with the very last of their strength and have often blown up in the air before impact. In some cases, the Patriot defensive missiles have hit only rubble.

None of the fired Scuds has reached a target more than 600 km away. For many experts, it is thus clear that Saddam, for whatever reasons, has been firing only the old al-Husayn type missiles. Because thus far no mounted fuel tanks have been found among the rubble—a characteristic of the al-'Abbas.

The gem of German missile technology, the Condor II, has also not been used. Germany-friend al-Sa'di, who was accorded the title of doctor for his work in arming the military forces, headed this missile program (Project 395) as well.

Former employees of the Messerschmitt-Boelkow-Blohm (MBB) arms concern initially planned the missiles, which have a range of 1,200 km and of which there are alleged to be five samples, for Argentina

and Egypt. The two-stage Condor, also known as Basdr 2000, was then manufactured in Iraq.

Ballistic tests were conducted at the military research center in Mosul, which was set up by German companies. An investigation of the Bavarian Projekt Betreuungsgesellschaft in Freising, a partner firm of MBB, is under way concerning deliveries for Condor II. The Bavarian company TMS, located near Munich, is also alleged to have provided technology for Condor II via Cairo.

There has already been considerable diplomatic commotion surrounding the two-stage missile. Just four years ago, seven Western nations, under pressure from the United States, agreed to no longer supply technology for missiles with a range of over 300 km and more than 500 kg of carrying force—an agreement directed at the Condor.

The Federal Government insistently warned industry against involvement in the Iraqi Condor project. Overall control of the project, the Ministry for Economics announced as late as April 1990 in a nine-page letter to leading industrial groups, was in the hands of the Technical Corps for Special Projects (TECO) in Baghdad, which pushed the construction of the supercannon.

The project, Ministry officials announced, was going under the code name Project 395. It was feared that Iraq would "make all efforts to hurry its development of missiles along further."

The case of Strabag in particular demonstrates how guileless German companies were in their dealings with Baghdad. The construction company, which is part of the Werhahn Group, built a highway and the Basra Airport, whereby the total value of the jobs came to DM2.3 billion.

Strabag had to add a large amount of money onto the deal. For a time, the outstanding accounts amounted to DM370 million, which company president Peter Jungen was eventually able to negotiate down to DM150 million.

The Cologne executives attached a great deal of importance to their good relations with their Iraqi customers. This could be one of the reasons that Strabag was party to many dubious transactions.

With TECO, which is under the jurisdiction of Saddam Husayn's son-in-law, Minister for Military Industrialization Husayn Karmil, the Cologne company concluded an agreement on assistance with Project 395. "The basic idea," according to a Strabag internal memo, was to support the Iraqis "through technical assistance and the supply of replacement parts." Essentially, this meant servicing construction machinery.

Because of the military nature of many projects, freedom of movement on site was restricted, Strabag engineer Kirsch said last summer.

Supervisory activities for 395 were not insignificant. On 18 August, 12 days after the embargo was imposed, an amount of DM204,000, due on 18 September 1990, was allocated, according to an internal survey of 9 January 1991 ("Status of Payments and Accounts Receivable, TECO 395").

The Office of the Public Prosecutor in Cologne has already initiated a judicial inquiry against Strabag. The company is suspected of violating the UN embargo in approximately 70 cases between mid-August and early December 1990.

These inquiries relate to the airport construction site in Basra, which was supplied with replacement parts, design plans, tools, and truck fittings by way of Jordan.

Many companies were involved in this and must now reckon with inquiries. Two companies have already been searched, and even an insurance company is now under suspicion: The Klaus Weihtag insurance company in Hamburg is alleged to have insured all Strabag deliveries ("Cologne via Amman to Basra") during the time of the embargo.

Investigators believe that Strabag may have violated the embargo with the 395 missile project as well. The ban on trade had long been in force, and banking transactions were already prohibited, when further action with Baghdad was laid out in an in-house report of 27 August at Strabag in Cologne. "Mr. Kirsch," the Strabag engineer in Baghdad, should attempt "to get as many initialed accounts from TECO as possible" and present them "to the Central Bank" in Baghdad.

At Strabag's urging, even the Commerzbank took action, attempting—as many telexes prove—to collect accounts in Baghdad for the construction company as late as in September and October. The financial institution considers this to be "completely proper."

Strabag too has a clear conscience. "To this day we do not know," says a spokesman, "that 395 is a missile program."

#### **Bonn Seen Negligent in Arms Exports to Iraq**

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p 31

[Article by Wolfgang Hoffmann: "The Great Hypocrisy: Despite Clear Indications Pointing to Illegal Exports, for a Long Time the Responsible Authorities Remained Inactive"]

[Text] When the first Iraqi Scud missiles of Soviet construction impacted along the periphery of Tel Aviv, many Israelis remembered what the former German defense minister, Rupert Scholz, had declared during his visit to Israel in April of 1989. Scholz, when cornered by Israelis with the question about German missile aid to Iraq, averred strongly that the Federal Government would make sure "that nothing terrible would happen."

The terrible thing now has happened, although, fortunately, not to the extent feared. Saddam's missiles, with their range considerably extended thanks to German know-how, had not yet been equipped with deadly poison. However, who wants to completely rule out that this would not also be possible?

The Germans must also be blamed for the fact that fear of the use of chemical weapons could even take hold in Israel. Quite soon, in March or April, the nightmare that is provoked by the war in the Gulf will also be unfolding in legal matters before the Land Court in Darmstadt. The Office of the Public Prosecutor is pondering the decision about indicting the companies, Karl Kolb GmbH, the liquidated Pilot Plan GmbH, Preussag and W.E.T. GmbH, Hamburg. The companies are suspected of having exported to Iraq illegally, either thoughtlessly or deliberately, those deadly technologies about which the former Economics Minister Helmut Haussmann stated that they "are now overtaking us with increasing information and casting renewed heavy shadows on the German export trade." As a study by the Simon-Wiesenthal-Center in Los Angeles and the MIDDLE EAST DEFENSE NEWS in Paris are confirming, the German "poison gas connection" with Iraq is one of the most inglorious export affairs of the German post-war period.

The efforts by Iraq to assemble an arsenal of chemical weapons dates back to the seventies. The first suppliers for the Iraqi chemical weapons production were the Americans, the Italians, and the French. However, the buildup of this industry was rather slow. At that time Baghdad was mainly interested in nuclear weapons and concentrated all its efforts on this goal. In 1981, when Israel destroyed, for the time being, Baghdad's dream to become the first Arab nuclear power by bombing the military nuclear reactor Osirak, the Iraqis pushed their reach for the "poor man's nuclear bomb." That is what the chemical weapons, with which primarily aggressive third world countries plan to equip themselves, are called.

However, the suppliers from the United States, France, and Italy quickly caught on. They suspended the export of chemical raw materials for nerve gases. Iraq had to look around for other sources. Karl Kolb, from Dreieich in Hesse, filled the gap. The company became the main supplier of the "secret of Samarra," as which the chemical factory in the desert was later exposed.

Sometime during 1983-84—the exact date is not known—the American CIA made it known to the [German] Federal Government that a specialized chemical weapons plant was being built by a German consortium under the leadership of Kolb, and that production as well as use in the Iran-Iraq war had started. Bonn promised remedial action. However, it was at first not possible to prove that the Kolb company had done anything illegal. Installations and parts from the company had only been exported for the purpose of manufacturing plant pesticides. The export of machines or

parts was forbidden and illegal only if they were "specially constructed" for the production of chemical weapons. According to the regulations of the export law of the time, only the criterion, "specially constructed," was decisive in determining the export of goods suitable for chemical weapons.

Nevertheless, the Economics Ministry forbade the company—whose slogan is, "In the Service to Humanity by Service to Science"—further exports and even tightened the regulations. From now on even the export of those installations would be subject to permit, if the installation could be "suitable" for the production of deadly chemical weapons.

The ban had barely been in effect when the "incredible" happened, as is still remembered in the office in the Economics Ministry responsible for export controls. The Kolb company went to court against the new restriction on its exports. There the characteristic "suitable" was excised in several decisions, because, among other reasons, this new regulation had gone into effect in a formally irregular manner during the Bonn summer break of August 1984 in a so-called indirect proceeding. In the meantime, the companies merrily continued their shipments. Initially Kolb did restrain itself, but other companies, such as Preussag and W.E.T. took over the business. Later on Kolb also continued. The deliveries were made via a detour which did not need a permit—no special license was needed for exports to Austria and Alsace. By 1987 installations and parts had been sent to Iraq totaling an estimated 40 million Mark.

The Economics Ministry reacted with some delay to the new situation created by the courts. But, instead of putting the clear characteristic "suitable" into a legally indisputable form, it was watered down in such a manner that the impression could be created that the German chemical industry had been the author. Forbidden was only the export of installations if they were "particularly suitable" for the production of pure chemical weapons plants.

The back and forth movements regarding the legally unassailable description of the criteria for the regulations and prohibitions concerning chemical exports did not only make the work of the regulatory authorities more difficult, but was also an obstacle in the criminal proceedings. Thus, the Office of the Public Prosecutor in Darmstadt, in a report to the Hessian Justice Ministry, complained still in 1989 that the installations supplied by Kolb and others were, in their opinion, "suitable for the synthesis of chemical weapons," but that this export would, because of the missing characteristic "specifically," scarcely be relevant under the legal code. The investigators in the Kolb matter considered themselves handicapped in other ways too. Particularly, a chemistry expert from the Bayer Concern, from whom it was expected that he would provide more precise information regarding the properties of the German supplies to Iraq, suddenly withdrew. The Federal Office for Defense Technology and Acquisition, which originally had been

ready to cooperate, suddenly stopped its assistance in the Kolb case. Only towards the end of last year, did the Swiss expert, Werner Richards, shed some light on the matter. He confirmed that the supplied installations were suitable for no other purpose than the production of chemical weapons. This expert opinion will be a substantial support for the prosecution.

However, this does not mean that anything has been decided for the future. Although in December of last year Economics Minister Haussmann finally changed the characteristic "specifically suitable" for the export of chemical installations to the stricter formula "suitable," this is still not sufficient. Experts believe that even the new version of number 2001 of the German embargo list is not yet sufficient to prevent a second Samarra from being built with German help.

In the opinion of an installation expert at the Oeko-Institut [Economics Institute] in Darmstadt, the regulation is written in such a weak manner "that perfectly legal installations can be exported with which certain chemical weapons can be produced, even nerve gas VX, an American development, which has been classified as most poisonous."

The Federal Government would have been able, years ago, with a simple pen-stroke, to rid itself of the onus of promoting German export at any price, even that of a terrible contribution to a new holocaust. Even a simple prohibition against all exports of installations that are suitable for mass destruction would have been enough, even if the responsibility would then have been fully turned over to the companies.

Such a regulation would also have been sufficient to prevent sensitive exports by the Gildemeister company to Iraq, or at least to bring suit against the company more rapidly. Gildemeister is suspected of having provided, in a certain sense, the second part of the decisive German arms aid to Iraq. This concerns an installation in which, among other things, missile know-how can be developed.

The Gildemeister subsidiary, Projecta, has been the general contractor for the building of a factory and laboratory complex near the Iraqi Mosul University, valued at about 1.6 billion German marks [DM]. The company denies any bad intent: "The project is not an industrial installation, but laboratories and shops, comparable to installations in universities, technical schools, and testing institutes, thus, equipment which has not been built specifically for military purposes."

In reality, the research installation of Mosul University was long ago identified as a military installation. Since August 1990, this has even been official. In the Economics Committee of the Bundestag, Economics Minister Haussmann declared that in the Gildemeister complex, "according to latest information, militarily usable missiles, airplanes, or other armaments were to be used...the German company Gildemeister was/is general contractor. The main German subcontractor is the company MBB [Messerschmitt-Boelkow-Blohm]."



Haussmann even admitted that the Bielefeld company has an export permit for the export of so-called dual-use goods, because it was officially assumed that this concerned a research project. Haussmann continued: "Based on first indications of the military character of this project, a permit stop was issued in 1987 and, starting in 1988, a final rejection of the accrued requests regarding this project. In May 1989 permits issued earlier were repealed in order to also prevent the local employment of German workers in technology-related work."

It has not yet been made quite clear whether Soviet Scud missiles had been refitted at Mosul or elsewhere in order to increase their range. It is considered certain that German missile know-how has reached Iraq—this via detours by way of earlier German-Argentine cooperation in this field, as well as directly through Egypt and Switzerland.

Even though, according to Haussmann's admission, the Federal Government had been informed about the German missile activities in Iraq since 1987, it has rejected all requests by the opposition, to radically interdict the participation of German citizens in the development and production of chemical weapons. To such a suggestion, made by the SPD [Social Democratic Party of Germany] Deputy Norbert Gansel in 1989, Otto Graf Lambsdorff, for many years, as economics minister, one of those responsible for the granting of German export licenses, responded: "If your legal interpretation were to be implemented, my late brother-in-law, who helped the Americans get to the moon, would have been punished and incarcerated...As is known, rockets can also be used for peaceful purposes, e.g., to lift satellites into space. As you have stated, it is also possible to transport bad things."

No other remark better reflects the export philosophy of the Federal Government. The current surprise that Iraq now obviously has missiles available with the range to reach Israel is simply hypocrisy. In fact, whenever American officials in Bonn proposed that rocket technology transfer should be further restricted, the Federal Government tried to wriggle out of it by pointing out that the export regulations were already very strict. According to their statement, the German embargo list was complete.

It is not, as has already been established in *DIE ZEIT* of 11 January 1991 ("Explosives Delivered Free"). While the United States has constructed a tight security net for the export of rocket technology, which can only be penetrated by considerable criminal effort, it is still possible to export installations for the production of civilian rockets from the Federal Republic, even without permit from the Federal Economics Office.

The German export practice with the disastrous differentiation between militarily relevant products and ambiguous civilian technology leads in practice again and again to the fact that the export of explosive rocket

technology can be approved. Electronic guidance elements which have to endure the strong vibrations of rocket propulsion, e.g., are classified as civilian electronics because the only poorly trained experts in the Federal Economics Office did not recognize the explosive capacity of such exports to Argentina. Thus, Iraq obtained another puzzle part for its long-range weapons carriers through its cooperation with Argentina.

Another example. The United States guards the export of technology for manned as well as unmanned space travel particularly strongly. However, the German embargo list restricts, under number 00010c, only the export of technology for unmanned space travel.

There are many gaps like this one. Now, the Federal Government appears to finally be giving serious thought to closing them. Foreign Minister Hans-Dietrich Genscher has firmly promised the Israeli Ambassador in Bonn, Benjamin Navon, that the laws will be tightened and the possibility for their enforcement "drastically improved." Genscher to Navon: "It is the firm desire of the Federal Government not to leave any loophole for dealers and producers of death."

It remains to be hoped that the Federal Government will rapidly institute the tightening, without being influenced by German industry. Otherwise, what took place with the last and insufficient tightening last year will happen again: the Federal Association of the German Industry still boasted two days ago that it "had been shaped with the considerable cooperation of German industry."

#### First Indictments of Poison Gas Deliverers

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[Unattributed report: "On-Site Inspection at Samarra"]

[Text] During a visit to Washington at the beginning of February, Otto Count Lambsdorff seemed to be visibly shocked. For 20 years, the Free Democratic Party of Germany chairman said, he has regularly visited the United States, but never had a visit been such a problem as this time: "German help" in the production of poison gas in Iraq is a "difficult issue."

The issue has not been concluded by a long shot. Even after the end of the Gulf war, the involvement of German companies in Iraq's weaponry will again make the headlines on both sides of the Atlantic over the next few weeks.

Because after about three years of investigations, this month the Darmstadt Public Prosecutor's Office will for the first time issue indictments, under filename 21 Js 35285/87, against the presumed deliverers of the Iraqi poison gas arsenal. And the 309-page final report of the "Iraq Special Commission" of the Customs Institute of Criminal Investigations (ZKI) in Cologne, on which the indictments are based, contains heretofore unknown accusations against West German and foreign managers.



In addition to merchants from the known companies, Karl Kolb and Pilot Plant from Dreieich in Hesse and Water Engineering Trading (W.E.T.) from Hamburg, managers of the Preussag AG of Hannover and several employees of smaller companies will probably also be indicted. They all—about one dozen—are said to have participated in the construction of the poison gas facilities in Samarra.

However, despite the massive accusations in the indictments, ridiculously short sentences will be faced in Darmstadt. The prosecution must limit itself to the criminal provisions of the lenient Foreign Trade Law. That law envisages three years in prison at the most in this case.

However, some defendants might face tougher sentences. They are also facing charges of embezzlement or fraud. The investigators accuse them of having used the quarrel over export permits for the desert in a profitable poker with the FRG Government about claims for damages.

The presumed fraud involved the export licenses for the Kolb export company. Since 1982 the company had been involved in the construction of the chemical factories in the Iraqi town of Samarra, where mustard gas, tabun, and prussic acid were produced.

Even though the Americans pointed out the existence of the poison gas facilities in Samarra in January 1984, exports continued illegally until 1987. When Bonn banned partial deliveries, the people from Kolb, outraged about the export halt, filed claims for damages amounting to 1.6 million German marks [DM].

The Bonn Economics Ministry was bulldozed by such impertinence and seriously negotiated with the chemical deliverers about damages. The FRG Government even allocated millions of marks for an out-of-court settlement.

Experts such as Frankfurt engineer Joachim Schulz or Heinrich Plinke from Bad Homburg were not so naive. In 1982 and 1984 they refused to participate in the work for the Samarra project. Schulz: "For me there was no doubt that it was intended to produce nerve gases."

The investigators now see Kolb's claims for damages as an "attempted fraud to the detriment of the FRG." It is impossible that the deliverers suffered any losses, because they had secretly used foreign companies to be able to continue with the project in Iraq.

Kolb conducted such roundabout deliveries via Neuberger Holz-und Kunststoffindustrie GmbH in Vienna. In August 1987 Kolb Manager Klaus-Joachim Fraenzel, a licensed electrical engineer with a second residence in Baghdad, became a shareholder in his helper Neuberger Holz, with a share of 13 percent (about DM200,000). Fraenzel is also a limited partner at Kolb.

An important export helper in France was the small company Protec. In February 1987 Pilot-Plant Engineer

Ewald Langer, 64, was even employed by Protec, obviously so as to guide the exports from there.

With such roundabout deals the string-pullers from Dreieich reaped millions in profits without being paid damages. Investigators assess all deliveries of German companies for the combat agent production at a value of DM90 million; the profit is estimated to amount to a total of DM18 million.

The export deal, which, according to the investigators' documents, was launched by a clique of former Preussag employees, obviously without the knowledge of the heads of the company, was no less profitable. The key figure is Nazar Al-Kadhi [spelling as published], who was the representative of Preussag in the Arab area from 1976 to 1982 and later rose to general agent.

Together with Peter Leifer, Preussag's Middle East expert, and Otto Holzer, the employee in charge of exports, Al-Kadhi had four filling stations for chemical combat agents including spare parts and accessories taken to Iraq in 32 partial deliveries on behalf of his company. The order had a value of DM7,477,795; the profit is estimated at about DM1.5 million.

In April 1984 the three men had two tank trucks taken to Iraq—value: about DM809,000. The vehicles were reportedly used to transport chemical combat agents between the production site and the filling station in Samarra.

Under the cover of Preussag, the defendants also acquired two thermal flue-gas purification facilities including fuel tanks and accessories valued at DM800,000. At Schwender company in Ibbenbueren, Leifer ordered DM3.2 million worth of parts for an assembly line in which airplane bombs were produced in Samarra. Allegedly, the facility was intended for the production of fire-extinguishers.

The damage to the image of Preussag, which obviously did not check its people enough, is enormous. However, the accusations under criminal law against the Preussag management are limited to Friedrich Bohling, 63. The engineer was temporarily responsible in the company for the Middle East region, and, in the view of the the Cologne ZKI investigators, he would have to have known about the violations if he had exercised his "powers of control and supervision" properly.

Bohling was told early about Al-Kadhi's irregularities by the head of the Middle East region, a Syrian. The manager justifies the fact that he did not do anything by referring to his excessive workload and to the fact that, because of the traditional enmity between the Syrian and the Iraqi Al-Kadhi, he believed the accusation to be false.

In Darmstadt responsible people from the smaller companies will probably also be put on trial. Reininghaus-Chemie from Laatzen is one of those companies. It is said to have delivered chemical substances, which,

according to an expert report by scientist Dieter Hallmann from Goettingen, can be used for the production of interim products for chemical combat agents. Insurance mediator Andreas Schwarz, also from Laatzen, is said to have mediated the transfers of chemical substances for Reininghaus co-owner Juergen Stockmeier.

Schwarz, a former recreational vehicle dealer, was hired by Al-Kadhi: People know each other in the poison-merchants' clique.

The Al-Kadhi/Leifer team later worked at W.E.T. in Hamburg. That company delivered culture-media for biological weapons and a facility for the preproduction of nerve gases.

W.E.T. also delivered the chemical facility with the project name MC 1, which disappeared somewhere in the Arab desert—the investigators only know that the facility is worth more than DM9 million.

It must be a gigantic facility. The delivery took place in 1987 and 1988 and comprised 39 individual units. During that time foreign trade investigators had already checked the business documents at W.E.T.—without finding anything objectionable.

No wonder. The orders sounded so harmless—and this is something that the accused W.E.T. managers now also claim—that not even they themselves suspected that their deliveries might be used for martial purposes.

However, that cannot be true, according to the investigators. Prosecution witness testifying to the lack of gullibility of the defendants is Manfred Ruck, the man who once approved the delivery of the seemingly harmless facilities at the Federal Economic Office in Eschborn. Ruck feels that he was taken in.

After the permit had been issued, parts of the facility in Samarra were considerably changed; in October 1984, during a flight back from Iraq, he expressly noted the need to obtain permits for various exports to Al-Kadhi.

The trial is expected to start in the autumn. If Iraq's dictator Saddam Husayn were no longer in power at that time, it would even be possible to have the court make a trip—for an on-site inspection at Samarra.

#### **Businessmen Charged With Arms Exports to Iraq**

LD1203155891 Hamburg DPA in German 1347 GMT  
12 Mar 91

[Excerpts] Darmstadt (DPA)—The Darmstadt public prosecution has brought charges against 12 businessmen for illegal arms exports to Iraq. The accused are charged with having several times violated the foreign trade law. As a result, Iraq has been able to produce chemical weapons, the public prosecutor's office announced on Tuesday.

Some of the accused also face charges of attempted fraud. They are said to have claimed damages from state

authorities, claiming that their exports were banned unjustifiably and were thus prevented. Even so, the accused did export their goods. [passage omitted]

The background to the charges is the suspicion that Karl Kolb Company from Dreieich (Offenbach district) and its subsidiary Pilot Plant as well as other firms supplied Iraq with a "production and research plant for pesticides," which was actually used for the production of poison gas. The public prosecution's expert, Swiss Professor Werner Richartz, after two years of examining the documents, reached the conclusion that the plant was "specially constructed" for the production of poison gas. [passage omitted]

#### **Nuclear Research Center Announces Budget**

91MI0171X Bonn WISSENSCHAFT WIRTSCHAFT  
POLITIK in German 16 Jan 91 pp 6-7

[Text] The Karlsruhe Nuclear Research Center (KfK) recently presented its medium-term work and financial schedules for the years 1991 to 1994 along with its 1991 program budget. They show that environmental research has taken the lead in the medium term among the Nuclear Research Center's main programs. Nuclear research and development work, therefore, recedes further into the background. Even so, the Nuclear Research Center still bears the main responsibility for the Federal Republic of Germany's international commitments in this field.

At present, the Nuclear Research Center's total budget is around 735 million German marks [DM]. This includes "permanent" funds amounting to about DM80 million for commitments such as the Laue-Langevin Institute in Grenoble, project management, and special funding. When the center's own earnings of DM123 million are subtracted, this leaves DM612 million that the KfK receives out of public funds.

With its 23 percent share of the budget, environmental research and development has highest priority, followed by nuclear fusion with 19 percent. The remaining quotas are: nuclear safety research (15 percent), solid-state and materials research (11 percent), nuclear waste disposal (10 percent), microengineering (8 percent), handling technology (7 percent), and basic physics research (6 percent).

Key technologies are now the pacemakers of technological change. The KfK is working on three fields in this category that have special significance for funding policy:

In **solid-state and materials research**, materials are being developed for advanced technical applications. At present, these are mainly high-stress materials and superconductors.

The discovery of superconductors at temperatures above the boiling point of nitrogen has speeded up development in this field worldwide. Studies are currently

focusing on the new oxidic superconductors, although the successful development of helium-cooled superconductors, which have almost achieved technical maturity, is not being neglected.

A well-advanced sector of the **microtechnology** program is the production of mechanical microcomponents by a process involving X-ray lithography and galvanoplastic casting technology.

The **handling technology** program is developing systems allowing combined operator-controlled and program-controlled automatic operation. The long-term target is the development of autonomous systems that incorporate sensor technology and information processing to develop artificial intelligence.

This major research center does not deal only with the "big players." The KfK has been arranging transfers of technological developments to medium-sized industrial companies and small enterprises for more than 10 years. As opposed to the major projects, where whole technological packages are developed in close cooperation with industry in accordance with targets set by the research policy makers, technology transfer means the industrial exploitation of peripheral spinoffs from major projects under which they will not be further pursued.

#### **Moellemann Supports Construction of New Reactors**

AU1403115091 Frankfurt/Main FRANKFURTER ALLGEMEINE in German 13 Mar 91 p 13

["K.B." report: "Moellemann in Favor of New Nuclear Reactors"]

[Text] Bonn, 12 March—FRG Economics Minister Juergen Moellemann has lent the West German electricity sector political support for the construction of two reactors in the new laender. After a talk with members of the executive boards of the Bayernwerk AG, Preussen Elektra AG, and RWE Energie AG on Tuesday, Moellemann stated that he would support the decisions to invest in new power plants of the Siemens-KWU convoy construction type. Moellemann again emphasized that he intends to re-establish a consensus in energy policy for the joint use of coal and nuclear energy. Talks with representatives of the government parties and the opposition in Bonn as well as with the laender will take place in the near future.

#### **Moellemann on Nuclear Plants, Tax Increases**

AU1803120891 Hamburg BILD AM SONNTAG in German 17 Mar 91 pp 2-3

[Interview with Economics Minister Juergen Moellemann by Michael H. Spreng, Friedemann Weckbach-Mara, and Philipp Kirschner in Bonn; date not given: "Moellemann: New Nuclear Power Plants in the West Also"]

[Excerpts] [BILD AM SONNTAG] In eastern Germany two new nuclear power plants are being built in Greifswald and Stendal instead of renewing the old ones. Do you plan to renew nuclear power plants in the west?

[Moellemann] There are no specific projects. However, we have to make use of nuclear energy as long as there is nothing better. In view of the imminent disaster regarding the world's weather, I do not see any alternative in the medium term, because additional coal-powered thermal power plants must not be inflicted on the environment. In addition, our price for a tonne of coal is about three times higher than the world market. Alternate energy supplies and, above all, energy savings are particularly important to us. Nevertheless, in the west, too, in the foreseeable future in some cases we will not be able to put off replacing older nuclear power plants with newer and safer ones. I am asking for all parties to agree to that solution. North Rhine-Westphalia and Saarland, which are governed by the Social Democratic Party of Germany, must know that subsidies for coal also depend on the attitude toward nuclear energy. [passage omitted]

[BILD AM SONNTAG] On 1 July taxes will increase—will that not ruin economic development?

[Moellemann] No. The economic development is too strong. I expect half a percent less growth (that is, 2.5 to 3 percent) and a correspondingly higher growth rate of prices (3.5 percent instead of 3 percent). On the other hand, growth stimuli are being introduced in the new laender, so that things will be about the same in the end.

[BILD AM SONNTAG] The people in the new laender are losing their patience. When will the newly established "Joint Action Program for Recovery in the East" finally bring the promised better future to the new laender?

[Moellemann] We must see one thing clearly: A tangible and lasting process of recovery will start only by the middle of next year—perhaps even in the spring. As a result of the investment allowance, special tax write-offs, and regional economic promotion, an entrepreneur with a 50-percent tax burden can now write off practically all of his investments during the first year. Such conditions will rarely be found anywhere else in the world. If things do not start to move now, it can only be the fault of the enterprises, which say: Let us go on producing here and using the east as our market. This must not be the case!

[BILD AM SONNTAG] What do you plan to do if sufficient numbers of qualified civil servants do not voluntarily go to the new laender?

[Moellemann] We have created financial incentives and promise quicker promotions for those who go to the new laender voluntarily. If this is not enough I will propose a conference of the Federal Government and the laender in order to transfer the needed number of civil servants to the east, and also without their agreement. This, however, should be the last resort. [passage omitted]

**Daimler-Benz Probed Over Weapons Sales to Iraq**  
*LD1603101691 Berlin ADN in German 0136 GMT  
16 Mar 91*

[Text] Hamburg (ADN)—In their investigations into the Daimler-Benz case the investigators have come across documents that seriously incriminate the concern. The news magazine DER SPIEGEL reports further that Daimler-Benz is said to have manufactured 20 heavy-duty transport vehicles for Iraq. It emerges from business documents that they were constructed as launch ramps for Scud-B missiles.

The transporters were converted in such a way that the missiles could be brought into launch position by means of a hydraulic system. The refitting was carried out by the Rhine firm of Marrel. Investigations into Marrel are already under way at the state prosecutor's office in Wuppertal.

According to DER SPIEGEL, leading employees of the concern are suspected of having received kickbacks for years in export deals for military vehicles and trucks. That suspicion was also a fundamental reason for the full-scale investigation at Daimler-Benz. A number of managers from the marketing department are said to have shared commission from vehicle sales with so-called advisors abroad. According to indications made to the state prosecutor's office, in a deal with Saudi Arabia alone, kickbacks to a value of at least 3.5 million German marks were agreed.

Suspicion was also aimed at Werner Niefer, deputy head of Daimler-Benz, whose office was also searched by the investigators. However, Niefer denied that to DER SPIEGEL. He said: "If I was ever involved in such dealings then you can chop off my right hand."

**Further on Investigation of Daimler-Benz**

**'Project 144' Code Name for Scuds**

*AU1803155191 Hamburg DER SPIEGEL in German  
18 Mar 91 pp 112-118*

[Unattributed report: "A Few Percent of the Commission"]

[Excerpt] Public prosecutors are investigating Germany's most renowned industrial concern. Over 100 investigators removed files from offices and private apartments of Daimler-Benz managers. The concern is suspected of having illegally sold military vehicles to other countries, and leading officials are suspected of having received unjustified commissions.

Germany's leading industrial concern supplied a total of 20 special heavy-duty transport vehicles to Iraq: flat-bed tractor trailers suitable for transporting weights of 75 tonnes and more. As late as in July last year, the last of the 20 MB 3336/A heavy-duty trucks was shipped to Baghdad.

A business partner of the Daimler concern, the Marrel company in Wuelfrath adapted the flat-bed tractor trailers for unmistakable purposes: The eight-shaft vehicles, which can also be used for transporting harmless construction vehicles, were offered as vehicles for the transportation of tanks by the Stuttgart-based company. In Wuelfrath they were modified for special purposes: The flat-bed tractor trailers were prepared to transport missiles.

There is no doubt that it was a deal involving war materiel, for which an export permit by the Federal Economic Office in Eschborn would have been required. However, the company did not apply for such a permit. For the Daimler concern the vehicles were simply flat-bed tractor trailers, which they supplied to the regime of Saddam Husayn and which were destined for "Project 144."

The management could have found out that there was more behind this harmless name. According to findings of the intelligence services, "Project 144" was the code name for Scud missiles, the weapons that the despot Saddam Husayn launched at Israel and Saudi Arabia in the Gulf war.

The investigators were alarmed by those findings. When visiting the Marrel company a few months ago, they discovered that Daimler transport vehicles were modified for military purposes in Wuelfrath. The Wuppertal public prosecutor has in the meantime initiated legal investigations against Marrel. The investigating experts took the opportunity to gather further evidence—through a large-scale search of the Daimler works by the Stuttgart public prosecutor last week.

On Thursday last week [14 March], over 100 public prosecutors, customs and tax investigators, and criminal officers were involved in an operation lasting the whole day. They searched the offices of the Daimler headquarters in Untertuerkheim and the apartments of several leading employees of the Stuttgart company. It was one of the most spectacular operations against an enterprise of its size and standing, and it casts a negative light on the Daimler concern.

The public prosecutors suspect that the Daimler-Benz enterprise is involved in illegal weapons deals with countries situated in areas of tension. In addition, several leading officials have themselves made profits from completely different deals. A few like-minded officials at the top level of the largest and most renowned industrial enterprise of the FRG have allegedly received millions of German marks [DM] over many years in the form of "kickbacks" [English term used] from—mostly foreign—business partners, as some kind of commission for the mediation of deals, in which uninvolved parties made unjustified profits.

In a systematic way, leading Daimler officials allegedly diverted sums at the enterprises' expense. In addition, the investigators are also looking for an apartment that was specially rented for keeping suspicious documents—



particularly documents on the payment of commissions. An employee, whose name the public prosecutors know, allegedly keeps the key to the apartment.

The public prosecutors had received a great deal of anonymous information. A 10-page typed report containing numerous explosive details is available to DER SPIEGEL. The details leave no doubt that the informer is from within the company's management. General Public Prosecutor Klaus Bieneck from Stuttgart pointed out: "The contents were so specific that, on the basis of the Penal Code, we were forced to initiate legal investigations."

"You can cut off my right hand if I was ever involved in such deals," stated Werner Niefer, the head of Mercedes-Benz, the automobile section of the Daimler concern. Niefer was mentioned in press reports last week on people who were suspected of having divided the secretly acquired money among themselves.

"Everything that the public prosecutors have removed from my office proves that Niefer has nothing to do with illegal commissions," the head of the Mercedes concern stressed.

Niefer does not deny that the concern exported trucks to Iraq before the annexation of Kuwait. However, Mercedes-Benz has always claimed that no permit is required for normal vehicles—vehicles that are not clearly destined for military purposes—according to the foreign trade law.

However, the customs investigators who participated in the mass search last week were so successful that Niefer and his colleagues will have to produce a few additional explanations. The documents seized at the Marrel company clearly show that the flatbed tractor trailers exported to Iraq were modified for "Project 144"—as mobile launch ramps for Scud missiles.

Thus, the flatbed tractor trailers were fitted with hydraulic stilts to give the vehicles more stability. In addition, they were equipped with devices that made it possible to shift a missile from the horizontal position to an inclined or vertical position. Even technical drawings of the missiles on the Daimler vehicles were discovered in Wuelfrath.

The investigators hope now that on the basis of the documents seized they will succeed in providing further evidence of shady arms deals by the Daimler concern. After all, they confiscated a great deal of material on Thursday.

The Stuttgart public prosecutor has so far not shown great enthusiasm when the region's biggest taxpayer, the Daimler-Benz concern, is involved. Thus, one public prosecutor wanted to drop proceedings investigating a largely unclarified road accident in Rome caused by Werner Niefer and involving a fine of DM60,000.

It was rejected by a judge, which is certainly not common in the German administration of justice. (DER

SPIEGEL No.3/1991) Only after complaints by private persons that referred to the report were legal investigations initiated against the public prosecutor, who wanted to let Niefer get away with a fine that is relatively low in comparison with his income.

The public prosecutors gave up their reservation for the first time about three weeks ago. They searched the office and the home of Mr. Mercedes, as Niefer likes to be called.

Together with his wife Vera, he is suspected "of having evaded taxes to a considerable extent." (General Public Prosecutor Johannes Haecker) Part of the comprehensive reconstruction of Niefer's private villa in Killesberg in Stuttgart has allegedly been paid for with Daimler money.

In addition to the bulletproof windows, the enterprise allegedly also financed the construction of fireplaces. However, the owner of the villa did not report that to the tax authorities.

The public prosecutors struck even harder after they received an anonymous complaint last week. Quick action was needed.

According to the informer, the flatbed tractor trailers (75 tonnes of loading capacity) were to be shipped to Saudi Arabia by the truck factory in Woerth at a total price of over 35 million riyals (about DM15 million).

The ship's space for the heavy cargo was allegedly already booked. The vehicles involved are clearly tank transport vehicles. However, Daimler-Benz has no permit for the export of military vehicles.

When searching the Woerth truck factory, the investigators discovered the 17 trucks, which were ready for export. In copies of offers for Riyadh and other documents, they frequently found the note "noncivilian version."

The investigators discovered a similar reference to the military version in documents on several dozen export deals with Middle East countries carried out in the past. The files also revealed that many of the heavy-duty transport vehicles were fitted with a hydraulic systems and other special devices in Switzerland by the Arbon and Wetzikon AG (NAW) company.

Apart from the Swiss weapons producing concern Oerlikon-Buehrle enterprise, Daimler-Benz also holds 40 percent of NAW's stock. NAW specializes in the production of special heavy-duty vehicles and tank parts.

The concern explained the planned supply of flatbed tractor trailers to Saudi Arabia in the following way: As a member of the board of managers, Helmut Werner stated on Friday last week [15 March], the company received an order from the allies who fought against Saddam Husayn. Daimler received the first inquiry in December 1990, he claimed.



Mercedes ordered the trailers for the tractor trucks—which are clearly military vehicles—from a French firm (the Lohr company). The French company received the export permit for the trailers from the French Government, after submitting an application. "That was quite understandable from the French position at the time," Werner stated, who is responsible for commercial vehicles at Daimler. "As a matter of fact, the French were very involved in the Gulf region."

"Because of the critical situation," the Mercedes-Benz company approached the Economics Ministry on 8 and 11 March, inquiring how the ministry would assess the possible supply of such vehicles, Werner pointed out. The company received a reply on 14 March—the day when the search was carried out.

"As of 14 March 1991, the export of tractor trucks to Saudi Arabia might become subject to permission," Werner quoted the letter from the ministry. That means that the deal was not subject to permission until 13 March, the deputy director of the Mercedes company stressed.

This conflict shows what difficulties Daimler is facing because of its arms deals. A spokesman of the Economics Ministry in Bonn stated that it is not clear whether the export of the Daimler vehicles is subject to permission. Since the German weapons concern Messerschmidt-Boelkow-Blohm (MBB) merged with Daimler-Benz, the previously solid automobile concern has been working in mined territory. The most recent investigations show how quickly a renowned enterprise can be damaged.

Daimler officials carried out business with the unpredictable dictator from Baghdad too readily. After the international outcry over German participation in the production of poison gas, Daimler is now confronted with massive criticism because of its participation in Iraq's armament. The Daimler subsidiary MBB has helped the Iraqis in many ways. Its offers included helicopters that were modified in other countries and participation in the development of the military research center in Mosul involving DM1.6 billion. MBB studies on a highly dangerous weapon with the explosive power of a small nuclear bomb, the fuel-air-explosive bomb, also reached Baghdad.

Even if the Iraqis received missiles from Bavaria, the deals were—naturally—completely legal. Through the Euromissile sales company (MBB share: 50 percent), founded in 1972, Saddam bought about 10,000 "Hot" and "Milam" antitank missile systems and 1,050 "Roland" antiaircraft missiles.

It looks as though it will no longer be possible in the future to carry out such deals without any problems. Sensitivity on the subject is growing. The Economics Ministry in Bonn—not President Richard von Weizsäcker, as reported—asked the Daimler subsidiary, Dasa, before the start of the German Industrial Fair in Seoul, to remove the model of a Tornado fighter plane from display.

The managers from Untertuerkheim are also irritated about the numerous vigils that have been held in front of Daimler branches since January. For that reason, the head of the Daimler concern, Edzard Reuter, took the offensive in February.

No economic topic in the FRG "is being treated with so much hypocrisy, cowardice, and opportunism" as the weapons industry, Reuter emphasized. Politicians should "face up to their responsibility and not slink off into the bushes if such a topic comes up in headlines."

Last month the leadership of the company informed its employees for the first time about Daimler's "stand on the current discussion about exporting sensitive goods" in a special three-page brochure.

According to the brochure, previous supplies to Iraq "took place with the full knowledge of the responsible politicians and within the framework of the legal regulations." However, it is true "that one must learn from these experiences and consider what a responsible export policy should be." Amid all this, one should not forget that the vehicle sector of the giant concern has for years been involved in dubious weapons activities. Internal statistics drawn up by Daimler managers ("Deliveries in millions of vehicles") show exactly how many vehicles have been sold to armed forces in the world. Thus, exactly 12,645 military vehicles were supplied to Iran between 1976 and 1986, and Iraq received 6,737 cross-country vehicles, Unimog trucks, and army trucks. Libya received 7,460 cars, and 6,648 military vehicles were sent to the crisis region of Pakistan.

It is quite obvious that export deals that are not quite above board invite unscrupulous employees to enrich themselves. Thus, the public prosecutors searched not just for documents of illegal weapons deals last week; they also investigated the suspicion that individual Daimler employees have made profits for themselves.

Secret commissions of between DM3.5 and 4 billion are allegedly to be paid in connection with the most recent planned deal with Saudi Arabia. The deal involves the delivery of 17 tractor trailers, which the Saudi Arabian Defense Ministry has ordered. The flatbed tractor trailers have been modified for tanks.

According to a complaint filed with the Stuttgart public prosecutor, the commission is to be divided between a whole group of Daimler officials and Saudi partners. The group allegedly includes leading marketing managers such as Peter Fietzek, member of the Mercedes-Benz managing board, who is responsible for the sale of commercial vehicles, and Eberhard Herzog, member of the Mercedes managing board, who is responsible for the sale of passenger cars. Several other sales representatives—section heads and department heads—are allegedly also involved.

Niefer, the head of Mercedes-Benz, stated that he cannot imagine that Daimler employees are taking secret commissions. [passage omitted]

### Daimler-Benz Rejects Accusations

AU1803212391 Frankfurt/Main FRANKFURTER ALLGEMEINE in German 18 Mar 91 p 19

["mih." report: "Daimler-Benz Rejects Accusation of Illegal Arms Exports"]

[Excerpts] Stuttgart, 17 March—The Daimler-Benz Corporation vigorously rejected the accusation of illegal arms deliveries to the Middle East. The Stuttgart Public Prosecutor's Office is currently conducting investigations concerning employees of Daimler-Benz and Mercedes-Benz because of possible violations of the foreign trade law. Reportedly, vehicles that were especially designed for military purposes were supplied to the Middle East without a permit. The investigations were initiated because of anonymous information. Helmut Werner, deputy chairman of the Mercedes Benz Management Board, who is responsible for the utility vehicle business, said at a news conference that, because of the dates mentioned, it could only refer to a planned delivery to Saudi Arabia that was not carried out at all.

Werner described the events like this: In December 1990 Mercedes received an inquiry about the supply of 17 tractor trailers to Saudi Arabia. The inquiry was made by the supreme commander of the Saudi Army on behalf of the allied armed forces in the Gulf war. Because Mercedes was only able to supply the towing vehicles, but not the appropriate attachments, the Stuttgart-based company turned to French producer Lohr, who applied for an export permit in Paris and received it. On 8 and 11 March, Mercedes asked the Federal Economics Ministry to evaluate the business transaction. According to Werner, the Bonn authority advised against it and pointed out that it would be subject to authorization as of 14 March. The business transaction was regarded as "critical" because of the attachments, which would have also made the transportation of tanks possible. According to Werner, the delivery was not carried out.

Werner also rejected assumptions that the investigations might refer to a deal with Iraq. The last supply to that country dates back to July 1990. From the 124 utility vehicles—90 percent of which are not cross-country—112 trucks were still on the transportation route on 2 August, the day of the invasion of Kuwait. Mercedes immediately ordered the return of those vehicles. According to Werner, they are now in the Netherlands. [passage omitted]

Matthias Kleinert, spokesman for Daimler-Benz, said over the weekend [16-17 March] that the attempt to establish a connection between Mercedes standard towing vehicles and Scud missile launchers is a "bad imputation." As Kleinert told this newspaper it is correct that Mercedes supplied approximately 20 all-purpose towing vehicles to the Marrel Company. That company reported that hydraulic stilts were attached, so that

heavy loading cranes could work on the towing vehicles. Mercedes did not know anything about a military purpose, he said. Moreover, the Marrel Company in Wuelfrath is the subsidiary of a French company. Thus, the granting of an export permit for the attachments would have been the French Government's business.

As Helmut Werner further reported at the news conference on Friday [15 March], when the embargo against Iraq was imposed, the implementation of a contract to manufacture under license buses and trucks in Iraq was also halted. Until that time, the construction of a factory with an annual capacity of up to 15,000 vehicles had not gotten further than the preparation of the area. As the contractor, Mercedes did not participate in the investments, he said.

Kleinert said that the anonymous information is another attempt to "unseat" Werner Niefer, chairman of the Mercedes Management Board, against whom the accusations are directed. Kleinert thinks that it is "inconceivable" and "impossible" that Niefer is connected with illegal weapons exports. There are currently two preliminary proceedings against Niefer, one of them also because of anonymous information. Kleinert stated that Niefer would not resign.

### TURKEY

#### Iraqi Unrest; Chemical Weapons

TA1303174691 Ankara ANATOLIA in Turkish 1650 GMT 13 Mar 91

[Text] Ankara (ANATOLIA)—Pointing out that developments in Iraq are being followed carefully, Foreign Ministry Spokesman Murat Sungar said: We are worried about reports to the effect that the Iraqi leadership might resort to chemical weapons.

In response to a question on reported uprisings in Iraq, Sungar said: We are closely following reports about armed clashes between troops loyal to the central government and certain opposing groups in Iraq, a war-torn country. We do not desire for the Iraqi people, for whom we have the best of feelings, to be involved in new sufferings even before the wounds of the war are healed. We hope that the Iraqi leadership will not resort to unacceptable methods in a bid to prevent unrest in the country.

Within this framework, we are worried about reports to the effect that the Iraqi leadership might resort to chemical weapons to prevent domestic unrest.

Turkey is opposed to the use of chemical and biological weapons and supports all efforts being made by the international community for the banning of these weapons and the destruction of the existing stocks. It is our sincere hope, therefore, for common sense to prevail and for our worries not to be realized.

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